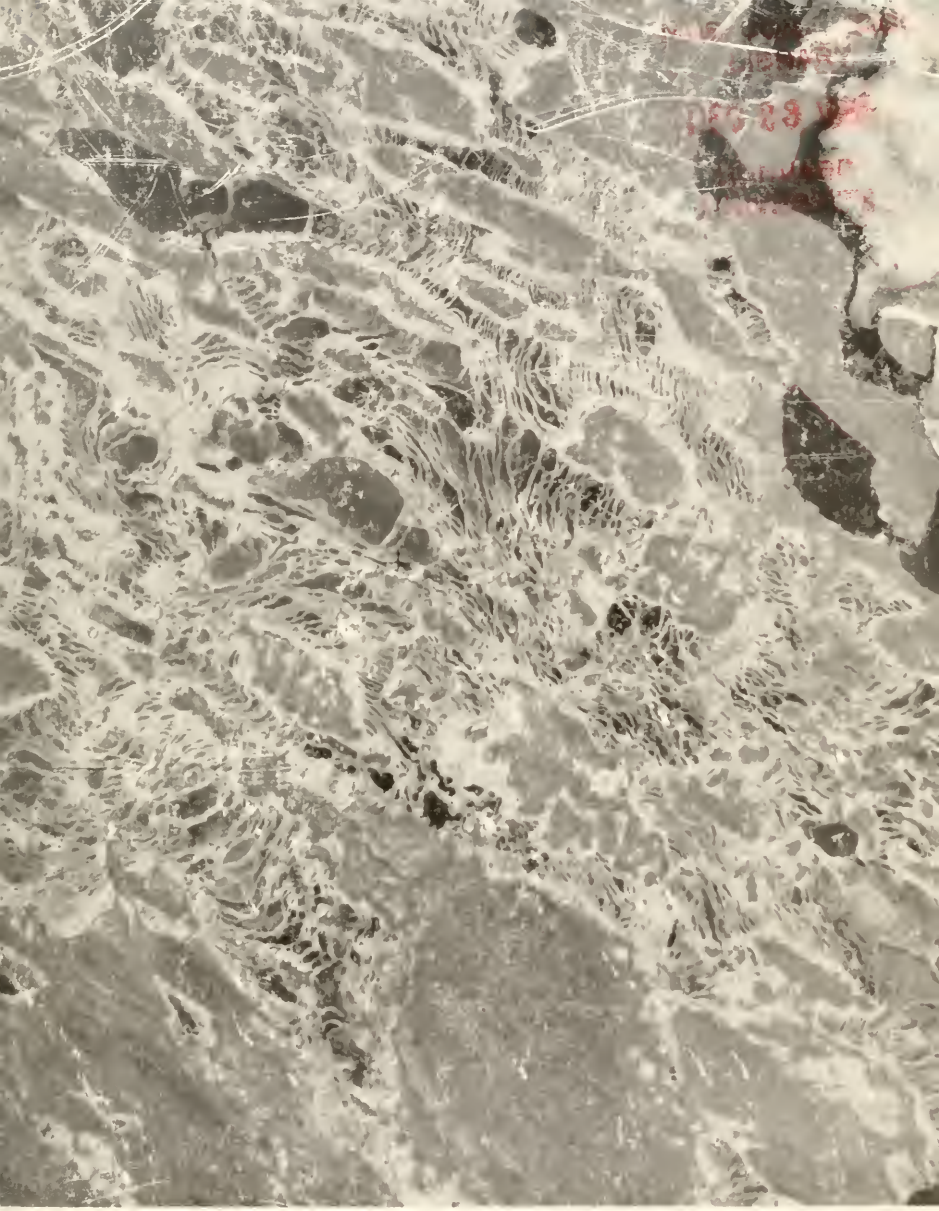

Plant and Animal Associations in the Interior of the Ungava Peninsula

by FRANCIS HARPER

Misc. Pub. No.

COVER: An extensive group of string bogs 8 miles west of Ashuanipi Lake, Labrador, at approximately lat. 52°46′ N., long. 66°28′ W. The part shown is about 3.4 × 3.1 miles in extent. A vertical photograph from an altitude of 18,000 feet above sea level, July 15, 1949. (Courtesy of Royal Canadian Air Force.)

To Dr. Herbert L. Lay, Jr.
with the regards of
Francis Harper

May 26, 1964

Plant and Animal Associations in the Interior of the Ungava Peninsula

BY

FRANCIS HARPER

UNIVERSITY OF KANSAS
LAWRENCE · KANSAS

University of Kansas
Museum of Natural History

EDITOR: E. RAYMOND HALL

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Introduction

The aim of this paper is to present a few simple data on the ecological relationships of plants and vertebrate animals in the Ungava Peninsula. Among the 18 particular localities or habitats discussed, apparently most of them had not been previously investigated by a biologist. However, the vegetation of various similar habitats in the Knob Lake area has been investigated and reported on by Hustich (1949*b*; 1951*a*; 1951*b*). Approximately half of my localities are in Labrador, the rest in Quebec. Only two of them, the burnt tract at Knob Lake and the lichen woodland at Lac Aulneau, had been appreciably affected by civilization. Consequently these notes may have a certain usefulness in representing primeval conditions in a region where industrialization is rapidly expanding.

The geographical positions of the various localities are indicated in the following list:

Labrador

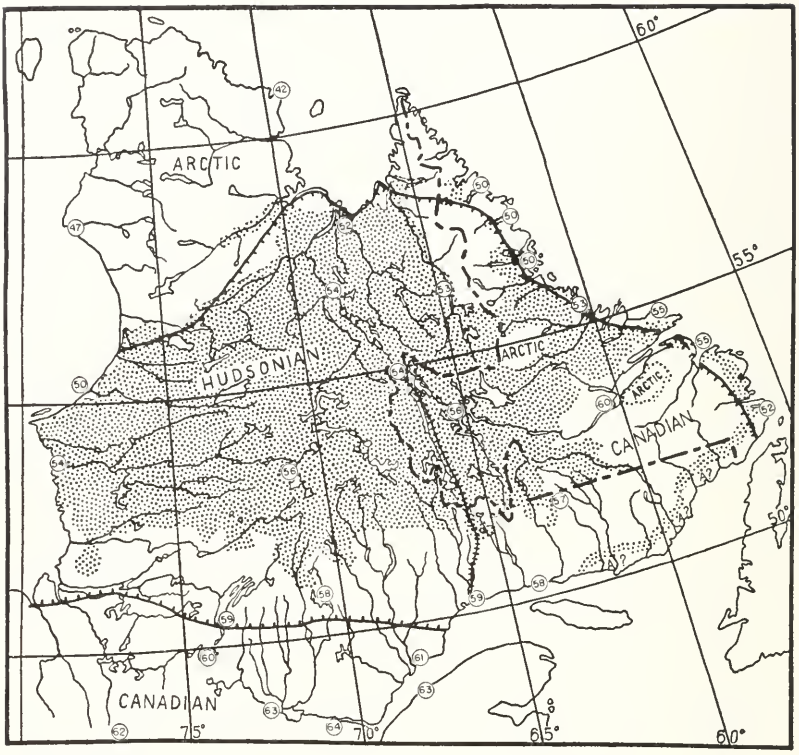
	Latitude	Longitude
Ashuanipi Lake, N. end	53°00′ N.	66°15′ W.
Attikamagen Lake, W. side	54°56′ N.	66°37′ W.
Carol Lake	53°04′ N.	66°58′ W.
Gilling River (mouth)	54°39′ N.	66°38′ W.
Lorraine Mountain	53°06′ N.	66°57′ W.
Mile 224 Airstrip	53°02′ N.	66°15′ W.
Ruth Lake Ridge	54°47′ N.	66°50′ W.
Slimy Creek	54°47′ N.	66°49′ W.
Stevens Lake	53°05′ N.	66°57′ W.
Sucker Creek	54°46′ N.	66°48′ W.

Quebec

Camp Brook	54°48′ N.	66°50′ W.
Hanna's Lake	54°49′ N.	66°42′ W.
Knob Lake	54°48′ N.	66°49′ W.
Lac Aulneau	57°01′ N.	68°38′ W.
Lake Wapanikskan (middle)	56°57′ N.	68°55′ W.
Leroy Lake	55°08′ N.	67°14′ W.
Mollie T. Lake	55°02′ N.	67°09′ W.
Sunny Mountain	55°03′ N.	67°12′ W.

All of the localities lie within the general confines of the Hudsonian Life-zone (map 1); but four of them rise above the tree-line to become part of the Arctic-alpine Life-zone. My stay at each place was too brief to permit extensive studies.

The rather complex geology of the region will be touched upon only lightly. All of my localities lie within the Canadian Shield, and with the exception of the closed-crown forest and a string bog near the north end of Ashuanipi Lake, they are restricted to a belt of Proterozoic rocks, commonly referred to as the Labrador Trough. This belt is about 60 miles wide in the central part, but narrows toward the



Hudsonian Life-zone according to present delimitation.

Hudsonian Life-zone (*fide* Merriam *et al.*, 1910).

Labrador-Quebec boundary.

Circled numerals indicate the approximate averages of daily mean temperature during the six hottest weeks of summer at various meteorological stations.

Map 1.—Life-zones (Arctic, Hudsonian, and Canadian) of the Ungava Peninsula. (Basic outline of map constructed, with permission of the Geological Survey of Canada, from Map 1045A, Geological Map of Canada, 1955.)

north end on Hudson Strait and toward the south end at about latitude 52°40′ N. The flora and the fauna became re-established in the region after its smothering and scouring by the Pleistocene glaciation. The mantle of glacial material is generally quite thin, and bedrock commonly lies no more than 2 or 3 feet beneath the surface in fairly large areas where no rock is exposed. The Proterozoic rocks lie with great unconformity on Archaean gneisses. Both sedimentary and volcanic rocks are present. The iron-ore bodies, whose discovery in recent years has been primarily responsible for the industrial devel-

opment of the interior, lie largely within the Labrador Trough. (This geological information is derived mostly from Harrison [1952:1–3, figs. 1A–1B]. See also Hare [1952].)

The Labrador Trough is marked by alternating ridges and valleys, extending in a NW–SE (or NNW–SSE) direction. Some of the ridges rise as high as 1200 feet above the adjacent valleys. The tree-line varies from about 2550 feet on Lorraine Mountain to 1900–2100 feet in the general Knob Lake area and about 900 feet at Lac Aulneau. The gradual lowering of the tree-line toward the north is partly an effect of latitude, and partly an effect of the increasing proximity of the cold waters of Ungava Bay. In the bottoms of the valleys are numerous lakes, streams, bogs, and muskegs.

Data on temperature, rainfall, and snowfall are available from three meteorological stations in this general region: Fort McKenzie, Quebec, about 20 miles southwest of Lac Aulneau; Knob Lake (old airstrip), Quebec, from which Attikamagen Lake lies northeast half a dozen miles, Sunny Mountain northwest 25 miles, and Leroy Lake northwest 30 miles; and Sandgirt Lake, Labrador, from which Mile 224 Airstrip lies southwest 70 miles and Carol Lake and Lorraine Mountain southwest about 90 miles. The records for the first of these stations cover 12 years; for the second, 5 years; and for the third, 6 years. The following table is copied from *Addendum to Volume 1 of Climatic Summaries for Selected Meteorological Stations in Canada,* issued by the Meteorological Division, Department of Transport, 1954:

Monthly and Annual Averages of Daily Mean Temperature

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Fort McKenzie	−13	−11	1	16	33	46	54	53	44	33	18	−2	23
Knob Lake	−13	−8	8	24	35	48	55	52	42	30	15	2	24
Sandgirt Lake	−9	−5	5	18	33	47	57	55	46	33	16	−1	24

Average Monthly and Annual Rainfall in Inches

Fort McKenzie	0.00	0.02	T	0.18	1.11	1.48	3.46	3.15	2.19	1.24	0.23	0.02	13.08
Knob Lake	0.00	0.00	0.08	0.23	0.35	2.88	3.76	2.82	2.23	1.40	0.45	0.13	14.33
Sandgirt Lake	0.00	0.00	T	0.05	1.83	3.26	3.92	3.82	3.40	1.54	0.48	T	18.40

Average Monthly and Annual Snowfall in Inches

Fort McKenzie	11.2	8.6	10.7	8.7	5.3	0.7	0.0	0.0	0.9	6.4	11.3	12.1	75.9
Knob Lake	13.9	16.7	19.0	10.9	5.5	4.5	T	0.4	6.2	18.1	25.0	11.9	132.1
Sandgirt Lake	15.9	24.8	12.3	17.7	10.9	0.8	0.0	0.0	0.4	6.4	18.5	35.0	142.7

It will be seen that there are only minor variations in temperature and rainfall between the three stations, but that Fort McKenzie has little more than half as much snowfall as the other two stations. These last two have some of the heaviest snowfall on the mainland of eastern Canada (*cf.* Thomas, 1953:chart 4-3). The average daily mean temperatures during the six hottest weeks of summer, indi-

cated on map 1 for 25 meteorological stations, are derived from the *Addendum* mentioned above.

The southern limit of permafrost apparently extends southward nearly to the Knob Lake area (Thomas, 1953:chart 8-1).

Comparatively little bare soil is in evidence, except on the shores of lakes, ponds, and streams, and on level patches of very slight extent (a few feet to a few yards in diameter) above the tree-line (*cf.* Tanner, 1947, 1:342, 345). Nearly everywhere else the ground is carpeted with mosses and lichens, together with some herbaceous plants.

Additional information on the general ecology of the mammals, birds, amphibians, and fishes of the region may be found in reports on those groups (Harper, 1956, 1958, 1961, and 1962*a*). There is also another paper (1962*b*) on climatic change and its effect on biogeography.

In most of the lists of both plants and animals on the following pages, the species are arranged in the order of frequency, as nearly as this could be estimated. These estimates are based in part on the number of specimens collected, and in part on the frequency with which I recorded the species in my field notes. In a few specified cases, by reason of insufficiency of data, a sequence of frequency is replaced by a systematic sequence.

House (1924), Porsild (1957; 1958), and Polunin (1959) have been drawn upon for certain common names of plants that were not readily found elsewhere.

The plant materials collected have been very kindly determined as follows: mosses, by Edwin B. Bartram (1953); lichens and hepatics, by W. L. Dix (1956); and vascular plants, by A. E. Porsild. I am glad to make additional acknowledgment to Dr. Porsild for a critical reading of an early draft of this manuscript. Dr. Ilmari Hustich has kindly done likewise.

For many courtesies in the field, I am much indebted to the Iron Ore Company of Canada. H. E. Neal, of that company, has kindly provided (*in litt.*, March 15, 1962) information on the southern limits of the Labrador Trough. Two very useful air photographs (front cover and figure 6) are included among the illustrations through the courtesy of the Royal Canadian Air Force.

Arctic-alpine Areas

The Arctic-alpine areas occupying many of the higher ridges and summits in the interior of Ungava offer a most inviting field for study. In flora and fauna they bear a close resemblance to the main Barren Grounds in the northern coastal areas, from which they are isolated by extensive stretches of the forested Hudsonian Life-zone. Their fauna has been much less known than their flora. The Arctic-alpine areas that I was able to investigate included the following:

Ridge at Lac Aulneau (lat. 57°01′ N., long. 68°38′ W.; summit, 1000 feet; tree-line, 900 feet).

Sunny Mountain (lat. 55°03′ N., long. 67°12′ W.; summit, 2700 feet; tree-line, 1900 feet).

Ruth Lake Ridge (lat. 54°47′ N., long. 66°51′ W.; summit, 2273 feet; tree-line, 2000 feet).

Lorraine Mountain (lat. 53°06′ N., long. 66°57′ W.; summit, 2955 feet; tree-line, 2550 feet).

The term "tree-line" is used here in essentially the sense of Hustich (1949*b*: 13); however, allowance is made for the occasional occurrence of scattered, under-sized spruces, tamaracks, or balsams above that line. The altitudes given for the tree-lines, and for the summit at Lac Aulneau, are only approximate.

The following table exhibits an interesting correlation between latitude and the altitude of the tree-line at three of the localities (the northernmost and the southernmost, and one in an intermediate position). I have added Fort Chimo for purposes of comparison.

Locality	Latitude	Latitudinal distance (in miles) from next locality to north	Approx. altitude of tree-line	Approx. increase, per mile of latitude, in altitude of tree-line (compared with next locality to north)
Fort Chimo	58°05′	—	100	—
Lac Aulneau	57°01′	73	900	11.0
Sunny Mountain	55°03′	140	1,900	7.1
Lorraine Mountain	53°06′	141	2,550	4.6

It is evident that the low temperature of the waters of Ungava Bay extends its influence over the climate (and consequently the biota) of the territory to the southward for a considerable distance.

Ridge at Lac Aulneau

On the west side of this lake (National Topographic Series, Fort McKenzie sheet) a long ridge extends parallel to it, at a distance of perhaps half a mile (fig. 1). Its summit rises about 500 feet above the lake. The Barrens occupying approximately the uppermost 100 feet of the ridge are marked by numerous lichen-covered rocks, including, at the south end, a cliff that apparently constituted the nesting haunt of a pair of American Rough-legged Hawks (*Buteo*

lagopus sancti-johannis), which kept screaming overhead. A little farther west, across a timbered depression, another rugged ridge rises about 200 feet higher than the first.

Observations and collections on the first ridge during a few hours on July 23 and 24 resulted in the following list of the vegetation:

Trees

Larix laricina	Tamarack

Shrubs

Ledum decumbens	Narrow-leaved Labrador tea
Ledum groenlandicum	Common Labrador tea
Betula glandulosa	Dwarf birch
Empetrum nigrum	Crowberry
Salix spp.	Willows
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Vaccinium vitis-idaea var. *minus*	Mountain cranberry
Arctostaphylos alpina	Alpine bearberry

Ground plants (vascular)

Saxifraga aizoon	White mountain saxifrage
Carex sp.	A sedge
Linnaea borealis var. *americana*	Twinflower
Poa glauca	Glaucous meadow-grass
Epilobium angustifolium	Fireweed
Tofieldia pusilla	False asphodel
Equisetum sylvaticum	Wood horsetail
Arenaria groenlandica	Greenland sandwort
Diapensia lapponica	Diapensia
Antennaria ?affinis	Pale? Everlasting
Eriophorum brachyantherum	Close-sheathed cotton-grass
Potentilla nivea	Snowy cinquefoil
Primula laurentiana	Bird's-eye primrose
Arnica plantaginea	Arnica

Mosses

Rhacomitrium lanuginosum

Lichens

Cladonia alpestris	Caribou lichen
Alectoria ochroleuca	
Parmelia centrifuga	
Cladonia rangiferina	Caribou lichen

The vegetation in general is fairly characteristic of the Arctic-alpine Life-zone. Only four of these plants were not found by Hustich (1951*b*), nor by myself, in the Knob Lake area: *Eriophorum brachyantherum, Ledum decumbens, Antennaria ?affinis,* and *Arnica plantaginea.* Tamarack is represented by stunted outposts encroaching on the Barrens from the forested area below. It is difficult to account for the apparent absence of *Ledum decumbens* in the more southerly Arctic-alpine areas of the interior; for in the Canadian Northwest it occurs not only in the Arctic Life-zone, but in the Hudsonian Life-zone and even in the Canadian Life-zone (*cf.* Raup, 1936:284; Porsild, 1957:map 265).

Two specimens each of the following mice were obtained among the rocks on the summit: *Clethrionomys gapperi ungava,* Ungava red-backed mouse; and *Phenacomys ungava ungava,* Ungava spruce mouse. The former ranges down through the adjacent timber to the shores of Lac Aulneau. Both mice represent different subspecies from their representatives in the Attikamagen Lake area and southward. The food available to them probably includes the seeds or fruit of *Betula glandulosa, Empetrum, Vaccinium* spp., and *Arctostaphylos.* The mice in turn probably contribute to the food supply of the Rough-legged Hawk.

By way of comparison with the Barrens on this western ridge, a few notes may be added concerning a sort of alpine area on a cliff that rises to a height of about 250 feet above the eastern shore of Lac Aulneau, opposite the geological camp. A brief visit to its upper part on July 25 revealed the following plants:

Shrubs

Rhododendron lapponicum	Lapland rosebay
Arctostaphylos alpina	Alpine bearberry
Salix sp. (prostrate)	A willow
Juniperus communis	Common juniper

Ground Plants (vascular)

Carex bigelowii	Bigelow's sedge
Dryas integrifolia	Mountain avens
Saxifraga ?aizoon	White mountain? saxifrage
Astragalus eucosmus	Elegant milk-vetch
Astragalus alpinus	Alpine milk-vetch
Arnica plantaginea	Arnica

These are of interest in that a majority of them appear to have alpine (and calcareous) affinities, although the spot is probably more than 100 feet below the tree-line on the western side of the lake; furthermore, fair-sized trees grow on the slopes above and behind the cliff. But the absence of trees on the rock surface has evidently given the alpine species a chance to develop there. I found no *Astragalus* elsewhere in Ungava, and Hustich (1951*b*) reports none from the Knob Lake area. Both species (*A. alpinus* and *A. eucosmus*) have been recorded along the Larch and Koksoak rivers (Dutilly and Lepage, 1950:174 and 1951:58; Dutilly, Lepage, and Duman, 1953:76–77), and on the northeastern coast of Labrador (Abbe, 1936:155).

A pair of Labrador Horned Owls (*Bubo virginianus heterocnemis*) was reported nesting on the cliff. A Labrador Jay (*Perisoreus canadensis nigricapillus*) and a Northern Shrike (*Lanius excubitor borealis*) were noted there.

Sunny Mountain

This mountain is situated 22 miles northwest of Knob Lake (National Topographic Series, Boundary Lake sheet, east half). The tree-line is reached at about 1900 feet on the southeastern side. An area bounded on three sides by the 2000-foot contour, and on the northwest by the saddle (about 2400 feet) between Sunny and Geren's mountains, is about 1.5 miles in length and nearly 1 mile in width. The longer axis lies NW–SE. The surface of the ground becomes increasingly rocky, and the vascular flora increasingly scanty, toward the summit. The Barrens that cover the higher slopes (Harper, 1958:pl. 2, fig. 1) stretch away to the northwest, across a depression, to Geren's Mountain (2821 feet) at a distance of 2 miles.

A feature of particular interest is a more or less perennial snowbank occupying a rocky, eastward-facing ravine on the southeastern flank of the mountain (fig. 2), at an altitude of some 2000 feet. In August, 1953, the snowbank was roughly 200 feet in length, with a maximum width of about 100 feet; its surface descended perhaps 30 feet between the upper and the lower margins. The surface was marked with innumerable spoon-shaped depressions, each a foot or more in length. Dust from the disintegrating sides of the ravine gave a reddish tinge to much of the snow surface. A narrow marginal portion of the snowbank on each side had been transformed into ice, as an indication of its more or less perennial nature. Several rivulets ran down its surface and collected in an icy pool at the base. A small stream meandered from this pool through the lower portion of the ravine for some rods before it disappeared by seeping into the ground. During the warm season of 1955 the snowbank all but disappeared, as I have been informed by H. E. Neal. Each winter the ravine is doubtless refilled with snow blown across the mountain by prevailing westerly winds (*cf.* Thomas, 1953:99, chart 3-11).

If the icy portion of the snowbank should prove to be perennial, it may perhaps deprive "an extensive névé at . . . 2500 feet" near Mugford Tickle, between Okak and Hebron, of the distinction of being "the southernmost perennial ice mass in Labrador" (Odell, 1933:200). (This depends, however, on the possibility of amplifying the meaning of "Labrador," as used here, to include the entire peninsula.)

The coolness and the moisture provided by this huge snowbank doubtless account for an exceptional variety of Arctic plants occupying the lower portion of the ravine and the adjacent slopes. The conditions here do not exactly accord with Tanner's statement (1947,

1:346) that the "snow valleys" or "snow-bank bottoms" have a scanty flora. The 22 species of vascular plants in the following list that are preceded by an asterisk were not collected by myself, during four months of botanical browsing, at any other locality in Ungava than Sunny Mountain, and for the most part only in the fascinating "alpine garden" in the immediate vicinity of the snowbank. Practically all are of distinctly Arctic affinities. All but five of these species, however, were collected by Hustich in the general Knob Lake area, as reported by Porsild (1951). These five are: *Carex williamsii, Oxyria digyna, Stellaria crassipes, Cardamine bellidifolia,* and *Gnaphalium norvegicum.* There is a general similarity between the vascular flora of Sunny Mountain and that of Irony Mountain, about 11 miles to the southward (*cf.* Hustich, 1951*b*:199–200). Three mosses and five lichens, likewise indicated by an asterisk, were collected by myself only on Sunny Mountain, and for the most part only in the vicinity of the snowbank; but there is perhaps little significance in this fact.

The following list, based upon four visits (August 10–15), contains more plant species (nearly 90) than that for any other local habitat discussed in the present paper.

Trees

Picea sp. (stunted)	Spruce

Shrubs

**Salix herbacea*	Dwarf willow
Phyllodoce caerulea	Purple heath
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Betula glandulosa	Dwarf birch
Empetrum nigrum	Crowberry
Rhododendron lapponicum	Lapland rosebay
Vaccinium vitis-idaea var. *minus*	Mountain cranberry
Salix vestita	Hairy willow
Arctostaphylos alpina	Alpine bearberry
Alnus crispa	Green alder
Salix cordifolia var. *callicarpaea*	Broad-leaved willow

Ground Plants (vascular)

Scirpus caespitosus var. *austriacus*	Tufted bulrush
**Luzula confusa*	Northern wood-rush
**Hierochloë alpina*	Alpine holy-grass
Carex bigelowii	Bigelow's sedge
Poa alpina	Alpine meadow-grass
Calamagrostis canadensis	Blue-joint grass
**Carex lachenalii*	Arctic hare's-foot sedge
Solidago multiradiata	Northern goldenrod
**Sibbaldia procumbens*	Sibbaldia
Polygonum viviparum	Alpine bistort
Tofieldia pusilla	False asphodel
Lycopodium alpinum	Alpine club-moss

**Oxyria digyna*	Mountain sorrel
Parnassia kotzebuei	Kotzebue's grass-of-Parnassus
Habenaria dilatata	Leafy white orchis
Dryas integrifolia	Mountain avens
Pyrola grandiflora	Large-flowered wintergreen
Poa glauca	Glaucous meadow-grass
Deschampsia flexuosa	Common hairgrass
Viola adunca var. *minor*	Sand violet
Castilleja septentrionalis	Northern painted-cup
Achillea nigrescens	Yarrow
Bartsia alpina	Alpine Bartsia
**Carex terrae-novae*	Newfoundland sedge
**Carex scirpoidea*	Scirpoid sedge
Diapensia lapponica	Diapensia
Anemone parviflora	Northern anemone
Dryopteris spinulosa var. *americana*	Spinulose wood-fern
**Cassiope hypnoides*	White heather
**Cerastium alpinum*	Alpine chickweed
Taraxacum lapponicum	Lapland dandelion
Saxifraga aizoon	White mountain saxifrage
Cystopteris montana	Mountain bladder-fern
Veronica alpina var. *unalaschcensis*	Alpine speedwell
Trisetum spicatum	Spiked Trisetum
**Arenaria humifusa*	Low sandwort
**Carex williamsii*	Williams' sedge
Dryopteris disjuncta	Oak fern
**Ranunculus allenii*	Allen's buttercup
**Arenaria sajanensis*	Siberian sandwort
Epilobium anagallidifolium	Pimpernel-leaved willow-herb
Luzula parviflora	Small-flowered wood-rush
**Stellaria longipes*	Long-stalked chickweed
**Stellaria calycantha*	Northern chickweed
**Stellaria crassipes*	A chickweed
Viola renifolia var. *brainerdii*	Kidney-leaved violet
Pedicularis groenlandica	Greenland lousewort
**Gnaphalium norvegicum*	Norwegian cudweed
**Gnaphalium supinum*	Alpine cudweed
Coptis groenlandica	Goldthread
Lycopodium selago	Mountain club-moss
Arabis alpina	Alpine rock-cress
**Juncus trifidus*	Three-forked rush
Heracleum maximum	Cow-parsnip
**Senecio pauciflorus*	Few-headed ragwort
**Cardamine bellidifolia*	Alpine bitter-cress

Mosses

Rhacomitrium lanuginosum	
**Polytrichum piliferum*	Hair-cap moss
Polytrichum juniperinum	Hair-cap moss
**Brachythecium albicans*	
Dicranoweisia crispula	
Dicranum elongatum	
**Pohlia drummondii*	
Campylium stellatum	
Drepanocladus uncinatus	
Pleurozium schreberi	Feather-moss

Hepatics

Preissia quadrata

Lichens

Cladonia alpestris	Caribou lichen
Rhizocarpon geographicum	
Parmelia centrifuga	
Alectoria ochroleuca	
Cladonia lepidota	Caribou lichen
**Lecidea magnussoni*	
**Lecidea ramulosa*	
**Lecidea vorticosa*	
**Lecanora polytropa* var. *alpigena* f. *acrustacea*	
**Lecanora gelida*	

These notes may be compared with those by Tanner (1947, 1:341–359) on the vegetation of various areas of mountain tundra on the northern coast of Labrador.

The only mammal obtained here was the Labrador varying lemming (*Dicrostonyx hudsonius*); a weathered skull, some nests, and numerous scats suggested the presence of a fair number of this species in the vicinity of the snowbank. Another individual was taken on near-by Geren's Mountain. A fragmentary old antler of the eastern woodland caribou (*Rangifer caribou caribou*) and scats of the American black bear (*Euarctos americanus americanus*) and of the eastern Canada porcupine (*Erethizon dorsatum dorsatum*) were the only definite additional signs of mammals that came under my observation. The last were in an ice cavity at the head of the snowbank. Cabot's caribou (*Rangifer caboti*), found on Geren's Mountain in June, 1957, by Roland C. Clement (Harper, 1961*a*:132, pl. 8, fig. 1), must inevitably occur on Sunny Mountain as well.

Birds of the following species, in small numbers, were noted in the alpine area:

Anthus rubescens rubescens	American Pipit
Eremophila alpestris alpestris	Northern Horned Lark
Lanius excubitor borealis	Northern Shrike
Perisoreus canadensis nigricapillus	Labrador Jay

In all probability the Pipit and the Horned Lark, as characteristic species of the Barren Grounds, breed in this area, and the shrike may do so at or near the tree-line. The single Labrador Jay was merely flying past the alpine garden. A Rock Ptarmigan (*Lagopus mutus rupestris*) was taken on Geren's Mountain on August 15, thus furnishing one of the extremely few summer records of this species in a forest-surrounded Arctic-alpine area of the interior of the Ungava Peninsula.

It is greatly to be hoped that the extraordinarily interesting snowbank and the adjacent alpine garden on Sunny Mountain will be preserved intact in any future mining operations in the area.

Ruth Lake Ridge

This ridge extends in a NW–SE direction on the northeastern side of Ruth Lake (National Topographic Series, Knob Lake sheet, west half). Those parts above the 2100-foot contour are about 4 miles in length and half a mile in width. Erratic boulders are perched here and there. Several tarns occupy depressions on these heights. Along the steep eastern side of the ridge the tree-line occurs at varying heights, from about 2000 to 2100 feet, but on the gradual slopes of the western side it can be much less definitely traced.

An interesting feature on the eastern slope is the sharp line of demarcation between the timber and the Barrens. Here, contrary to the ordinarily gradual transition from one zone to another, a moderately thick stand of spruces (about 40 feet in height) reaches an abrupt limit and is succeeded immediately by treeless Barrens. An explanation is perhaps to be found in the vast amounts of snow that are driven across the summit of the ridge by the predominantly westerly winds of winter (Thomas, 1953:99, chart 3-11). In accumulating to a very considerable depth on the steep eastern slope and against the forest buttress, and in so remaining until well along in June, the snow cover may be effective in preventing the growth of tree seedlings just outside the forest. At considerably higher points on the western side of the ridge there is a sparse and scrubby growth of spruce.

A few hours of investigation on June 6 and 13 and October 5 (before and after the main flowering season) resulted in the following list of the vegetation (which is particularly incomplete as to the vascular ground plants):

Trees

Picea glauca (stunted)	White spruce
Picea mariana (stunted)	Black spruce

Shrubs

Betula glandulosa	Dwarf birch
Loiseleuria procumbens	Alpine azalea
Arctostaphylos alpina	Alpine bearberry
Vaccinium vitis-idaea var. *minus*	Mountain cranberry
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Phyllodoce caerulea	Purple heath
Empetrum nigrum	Crowberry
Ledum groenlandicum	Common Labrador tea
Salix uva-ursi	Bearberry willow

Ground Plants (vascular)

Diapensia lapponica	Diapensia
Lycopodium annotinum var. *pungens*	Bristly club-moss
Arenaria groenlandica	Greenland sandwort
Juncus filiformis	Thread rush
Carex saxatilis var. *miliaris*	Rock sedge
Lycopodium selago	Mountain club-moss

Mosses

Ceratodon purpureus
Tortella fragilis
Tortella tortuosa
Hypnum hamulosum

Lichens

Cladonia alpestris	Caribou lichen
Stereocaulon fastigiatum	
Cladonia mitis	Caribou lichen
Alectoria ochroleuca	
Alectoria implexa	
Cladonia rangiferina	Caribou lichen
Parmelia encausta	
Rhizocarpon microsporum	
Mycoblastus sanguinarius	
Xanthoria candelaria	
Lecidea paupercula	

Alectoria ochroleuca is evidently a characteristic lichen of the Arctic-alpine areas in the interior of the peninsula; I found it only in such habitats. Two miles east of Ruth Lake Ridge, it appeared on the rather bare summit of the "knob" that gives its name to Knob Lake. Here the tree-line comes close to the summit, which has an elevation of approximately 1825 feet—nearly 200 feet below the tree-line on the comparatively sheltered eastern side of Ruth Lake Ridge. This is reminiscent of the situation on three adjacent peaks in the Adirondacks (Mounts Marcy, MacIntyre, and Wright), where the tree-line occurs at progressively lower altitudes as the peaks decrease in height. In the latter case it has been suggested that wind may be "a more important factor than *exact* altitude or temperature in limiting tree growth" (Harper and Harper, 1929:22). This may be at least a partial explanation of the difference in altitude of the tree-line on Ruth Lake Ridge and on the "knob" near Knob Lake. For summits of limited extent, in comparison with points at the same elevation on the sides of larger and higher mountains, are exposed to winds from all directions.

The occurrence of the dung-loving or "ornithocoprophilous" lichen, *Xanthoria candelaria,* on a prominent boulder was doubtless the result of the use of this boulder as a perch by hawks and owls (*cf.* Harper, 1953:8).

Numerous microtine tracks (perhaps chiefly of the Labrador varying lemming, *Dicrostonyx hudsonius*) appeared in the snow on October 5. Tracks of Labrador red foxes (*Vulpes fulva bangsi*) were evident on the same date.

A pair of Northern Horned Larks (*Eremophila alpestris alpestris*) were seen on June 6, and an Eastern White-crowned Sparrow (*Zonotrichia nigrilora*) and an Eastern Tree Sparrow (*Spizella arborea arborea*) on June 13. These were doubtless on or near their nesting grounds. On October 5 two coveys of Ungava Willow Ptarmigan (*Lagopus lagopus ungavus*) were found on the summit, and a Labrador Jay (*Perisoreus canadensis nigricapillus*) at tree-line. The Ptarmigan may have migrated from some more northerly locality.

Lorraine Mountain

This mountain, unnamed on the Ashuanipi sheet (National Topographic Series), lies about 2 miles west of Wabush Lake. Its summit, at 2955 feet, is the highest point I reached on the peninsula. Its roughly cone-shaped upper slopes, rising about 400 feet above the tree-line, occupy probably several hundred acres. There are small spurs on the southern and northwestern sides, a tarn and a sedge bog of several acres on the northeastern slope, and a scrubby thicket of balsam and spruce about 300 feet below the summit on the eastern slope. On the southwestern side, by which I ascended, there is a tree-line transition zone consisting of thickets of alder and scrubby spruce, which I do not include in the Arctic-alpine area. My investigations were limited to a period of five or six hours on September 11.

In the following list of plants that were collected or observed, those species with a prefixed asterisk are ones that I did not happen to find in the more northerly Arctic-alpine areas, although that may have been a matter of chance and of little significance in some of the cases.

Trees

Picea glauca (stunted) ..... White spruce
**Abies balsamea* (stunted) ..... Balsam fir

Shrubs

Vaccinium uliginosum var. *alpinum* ..... Alpine bilberry
Arctostaphylos alpina ..... Alpine bearberry
Vaccinium vitis-idaea var. *minus* ..... Mountain cranberry
Empetrum nigrum ..... Crowberry
Betula glandulosa ..... Dwarf birch
Ledum groenlandicum ..... Common Labrador tea
Phyllodoce caerulea ..... Purple heath
Salix sp. ..... A willow

Ground Plants (vascular)

Lycopodium alpinum	Alpine club-moss
**Carex paupercula*	Bog sedge
Cornus canadensis	Bunchberry
Carex bigelowii	Bigelow's sedge
Diapensia lapponica	Diapensia
Luzula parviflora	Small-flowered wood-rush
Lycopodium annotinum var. *pungens*	Bristly club-moss
Trientalis borealis	Star-flower
Lycopodium clavatum var. *monostachyon*	Running club-moss
**Agrostis borealis*	Northern bent-grass
Rubus chamaemorus	Baked-apple berry
**Clintonis borealis*	Yellow Clintonia
Solidago sp.	Goldenrod
Epilobium angustifolium	Fireweed
Coptis groenlandica	Goldthread
Lycopodium selago	Mountain club-moss
**Veratrum viride*	White hellebore
**Carex arctogena*	A sedge
Dryopteris spinulosa var. *americana*	Spinulose shield-fern

Lichens

Cladonia alpestris	Caribou lichen
Stereocaulon fastigiatum	
Alectoria ochroleuca	
**Caloplaca elegans*	

Carex paupercula, apparently the predominant plant of the sedge bog, was not noted on drier ground. Lorraine Mountain is perhaps the northernmost known station in the upper Hamilton Basin for *Clintonia* and *Veratrum. Caloplaca elegans,* as one of the "ornithocoprophilous" lichens, occurred characteristically on a boulder which tops the southern spur of the mountain and doubtless serves as a more or less habitual perch for birds of prey (*cf.* remark on *Xanthoria,* p. 17).

There were microtine scats among rocks of the upper slopes and runways of *Microtus pennsylvanicus enixus* among the *Carex paupercula* of the sedge bog. Tracks of the eastern woodland caribou (*Rangifer caribou caribou*) were in evidence about the tarn.

A flock of about 40 Northern Horned Larks (*Eremophila alpestris alpestris*) and one of half a dozen American Pipits (*Anthus rubescens rubescens*) were met with on the upper slopes. Several Eastern Tree Sparrows (*Spizella arborea arborea*), an Eastern White-crowned Sparrow (*Zonotrichia nigrilora*), and a White-throated Sparrow (*Zonotrichia albicollis*) were found in the thicket of balsam and spruce. Droppings and feathers of the Canada Goose (*Branta canadensis* subsp.) were noted at the tarn. Quite possibly all of these birds breed on Lorraine Mountain, but some of them may have been

merely on migration from farther north at this date. For the five smaller bird species this is probably one of the highest altitudinal records in the peninsula.

Forested Areas

Closed-crown Forest at Lac Aulneau

The "closed-crown forest," while constituting the predominant type of vegetation in the Canadian Life-zone of the Ungava Peninsula, is not restricted to that zone. Hare (1959:map 1) shows patches of it scattered through much of the Hudsonian Life-zone, even as far as the shores of Ungava Bay. Hare's more recent term (1959), "closed-crown forest," seems preferable to the earlier "close-forest" (Hare, 1950:625; Abbe, 1955:15; Rowe, 1959:10).

Lac Aulneau (National Topographic Series, Fort McKenzie sheet) lies close to the boundary between the Ungava Forest-Tundra Section and the Koksoak Forest-Tundra Section of Hustich (1949*a*:40–41, fig. 3). This locality, however, is far from conforming to Hustich's description (p. 41) of the first-mentioned section: "The forest occurs only in patches and the whole area is dominated by barren-ground with characteristic plant and animal life." On the contrary, the immediate vicinity of the lake is dominated by forest, and the isolated patches of Barren Grounds occur chiefly above the tree-line, which is located at an altitude about 400 feet above the lake. The Koksoak forest-tundra is credited with richer vegetation than that of the Ungava forest-tundra, and it is said to include balsam fir, balsam poplar, and white birch. I found none of these trees at Lac Aulneau. As far as I am aware, there is no published report on the general vegetation of an area nearer than the valley of the Larch and Koksoak rivers and the lowermost course of the Kaniapiskau, lying 45–50 miles to the northwest (*cf.* Dutilly, Lepage, and Duman, 1953). There is, however, Hare's photo-reconnaissance survey (1959:map 1), which seems to furnish some evidence in support of Hustich's view. Nevertheless, I am inclined to defer acceptance of that view pending a terrestrial investigation of the biota of the general area between the lower Kaniapiskau and the lower Whale rivers.

During my stay from July 22 to August 2, field work was severely hampered by seven days of rain. Thus it cannot be considered that the following list of plants represents more than a small fraction of the vegetation.

The geological camp whose hospitality I enjoyed is situated on the west side of the lake, about 4 miles from the south end. In its gen-

eral vicinity (but not including the knoll on which the camp is situated) the vegetation appears to be predominantly of the closed-crown forest type (*cf.* Hare, 1950:622, and 1959; Dansereau, 1955: 85). The following list pertains to this type in a limited area on both sides of the lake:

Trees

Picea glauca	White spruce
Larix laricina	Tamarack

Shrubs

Alnus crispa	Green alder
Salix spp.	Willows
Betula glandulosa	Dwarf birch
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Ledum groenlandicum	Common Labrador tea
Juniperus communis	Common juniper

Ground Plants (vascular)

Cornus canadensis	Bunchberry
Mitella nuda	Northern miterwort
Moneses uniflora	One-flowered wintergreen
Pyrola secunda var. *obtusata*	Nodding wintergreen
Cystopteris montana	Mountain bladder-fern
Lycopodium complanatum	Trailing club-moss
Equisetum sp.	Horsetail
Coptis groenlandica	Goldthread
Listera cordata	Heartleaf twayblade

Mosses

Hypnum crista-castrensis	Feather-moss

Lichens

Cladonia lepidota	Caribou lichen
Parmelia encausta	
Bacomyces roseus	

The white spruces, which appear to be several times as numerous as the tamaracks, attain a height of probably at least 40 feet.

Mammals

Clethrionomys gapperi ungava	Ungava red-backed mouse
Tamiasciurus hudsonicus ungavensis	Ungava red squirrel
Lepus americanus americanus	American snowshoe rabbit

Birds

Perisoreus canadensis nigricapillus	Labrador Jay
Zonotrichia nigrilora	Eastern White-crowned Sparrow
Passerella iliaca iliaca	Eastern Fox Sparrow
Parus hudsonicus hudsonicus	Hudsonian Chickadee
Regulus calendula calendula	Eastern Ruby-crowned Kinglet
Hylocichla minima minima	Gray-cheeked Thrush

The garbage pit in the woods at a little distance from the camp kitchen attracted red squirrels, Labrador Jays, and probably others among the mammals and birds.

Aside from a different subspecies of *Clethrionomys,* the vertebrates found in the closed-crown forest at Lac Aulneau show no taxonomic differentiation from those in similar habitats at Attikamagen Lake and elsewhere in the upper Hamilton River basin.

Closed-crown Forest at Attikamagen Lake

The period from July 1 to 14 was spent at the Iron Arm of Attikamagen Lake, and that from July 15 to 22 at the Northwest Bay of this lake (National Topographic Series, Knob Lake sheet, east half). The vegetation in both localities consists largely of closed-crown forest. The other principal local terrestrial habitats are Barrens above the tree-line (west side of the Iron Arm), lichen woodland, muskegs, and more or less open bogs of mosses and sedges. The whole environment in 1953 appeared to be a virgin wilderness, except for a few camp spots that had been cleared somewhat by Montagnais Indians and prospecting parties. In no other wooded part of Ungava did I find such a veritable wild-flower garden, springing out of a thick, soft carpet of mosses and lichens on the forest floor, over which one passes with a noiseless tread. With the exception of the rocky lake and stream shores and certain rocky or gravelly areas above the tree-line, practically no bare ground is visible anywhere.

The closed-crown forest generally occupies higher and less level ground than the muskegs. It extends from the lake edge at 1536 feet to the tree-line at about 1850–1900 feet. The white spruces attain a height of 60–70 feet and a diameter of probably 20 inches or more. These, with the black spruces, balsam firs, and tamaracks, stand sufficiently close together to provide a fairly dense shade. Such an environment seemed to provide a congenial haunt for the Olive-backed Thrush, at the highest latitude (54°56′ N.) from which the species is known in the peninsula.

Some of the species in the lists below may not be typical of the local closed-crown forest as a whole. Within this habitat the following were found only in damp, mossy woods of spruce, willow, and alder along a rocky brook that discharges the waters of Lac Sans Chef into a cove on the west side of Northwest Bay; here the conditions may very slightly approach those of a muskeg. Vascular plants: *Dryopteris disjuncta, D. phegopteris,* and *Athyrium.* Mosses: *Mnium,*

Paludella, Calliergon, and *Hylocomium pyrenaicum.* Lichens: *Alectoria sarmentosa* and *Usnea.* Mammals: *Synaptomys* and *Phenacomys.* Moreover, of balsam poplar I found only a small stand along a brook entering the Iron Arm at its northwestern end.

The plants of the closed-crown forest at Attikamagen Lake include the following:

Trees

Picea glauca	White spruce
Picea mariana	Black spruce
Abies balsamea	Balsam fir
Larix laricina	Tamarack
Populus balsamifera	Balsam poplar

Shrubs

Salix planifolia	Flat-leaved willow
Ledum groenlandicum	Common Labrador tea
Salix vestita	Hairy willow
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Alnus crispa	Green alder
Vaccinium vitis-idaea var. *minus*	Mountain cranberry
Empetrum nigrum	Crowberry
Betula glandulosa	Dwarf birch
Viburnum edule	Mooseberry
Ribes glandulosum	Skunk currant
Amelanchier bartramiana	Mountain shadbush

Ground Plants (vascular)

Cornus canadensis	Bunchberry
Carex vaginata	Sheathed sedge
Equisetum sylvaticum	Wood horsetail
Lycopodium annotinum	Bristly club-moss
Coptis groenlandica	Goldthread
Rubus acaulis	Dwarf raspberry
Geocaulon lividum	Northern Comandra
Trientalis borealis	Star-flower
Mitella nuda	Northern miterwort
Equisetum pratense	Meadow horsetail
Petasites sp.	Sweet coltsfoot
Linnaea borealis var. *americana*	Twinflower
Athyrium filix-femina var. *laurentianum*	Lady-fern
Moneses uniflora	One-flowered wintergreen
Habenaria dilatata	Leafy white orchis
Viola adunca var. *minor*	Sand violet
Heracleum maximum	Cow parsnip
Streptopus amplexifolius var. *americanus*	Twisted-stalk
Rubus chamaemorus	Baked-apple berry
Habenaria obtusata	Blunt-leaf orchis
Cystopteris montana	Mountain bladder-fern
Gaultheria hispidula	Creeping snowberry
Dryopteris disjuncta	Oak fern
Dryopteris phegopteris	Long beech-fern

Mosses

Pleurozium schreberi	Feather-moss
Sphagnum sp.	Sphagnum moss
Hypnum crista-castrensis	Feather-moss
Calliergon stramineum	
Hylocomium splendens	Feather-moss
Mnium punctatum	
Dicranum fuscescens	
Dicranum bergeri	
Paludella squarrosa	
Hylocomium pyrenaicum	Feather-moss

Lichens

Alectoria implexa	
Parmelia encausta	
Cladonia gracilis var. *chordalis*	Caribou lichen
Cladonia mitis	Caribou lichen
Cladonia alpestris	Caribou lichen
Cetraria pinastri	
Usnea cavernosa	Beard lichen
Cladonia fimbriata	Caribou lichen
Cladonia turgida	Caribou lichen
Cladonia gonecha	Caribou lichen
Cladonia cenotea f. *crossota*	Caribou lichen
Parmelia incurva var. *radians*	
Alectoria sarmentosa	

The mammals of this habitat include the following:

Clethrionomys gapperi proteus	Labrador red-backed mouse
Microtus pennsylvanicus enixus	Hamilton Inlet meadow mouse
Tamiasciurus hudsonicus ungavensis	Ungava red squirrel
Erethizon dorsatum dorsatum	Eastern Canada porcupine
Lepus americanus americanus	American snowshoe rabbit
Synaptomys borealis medioximus	Labrador lemming mouse
Phenacomys ungava crassus	Labrador spruce mouse
Marmota monax ignava	Labrador woodchuck
Euarctos americanus americanus	American black bear

The plant life of this habitat furnishes the above-mentioned mammals with much or even (in some cases) all of their food: for example, bark of the conifers for the porcupine (*cf.* Hustich,, 1951*b*:178); cones of the spruces for the red squirrel; berries of the Ericaceae and probably fruit of *Betula, Viburnum, Ribes,* and *Amelanchier* for the mice and at least part of these for the red squirrel and the black bear; probably bark of *Ledum* for the red-backed mouse; and probably certain lichens and mosses for the red-backed and lemming mice. (*Cf.* Harper, 1961:*passim.*)

The closed-crown forest about Attikamagen Lake furnishes one more illustration of the paucity of bird life in fairly dense timber, especially in northern regions. Only the following species were definitely recorded in this habitat:

Birds

Regulus calendula calendula	Eastern Ruby-crowned Kinglet
Hylocichla ustulata swainsoni	Olive-backed Thrush
Perisoreus canadensis nigricapillus	Labrador Jay
Seiurus noveboracensis	Northern Water-thrush
Junco hyemalis hyemalis	Slate-colored Junco
Dendroica coronata coronata	Eastern Myrtle Warbler
Zonotrichia nigrilora	Eastern White-crowned Sparrow
Hylocichla minima minima	Gray-cheeked Thrush
Passerella iliaca iliaca	Eastern Fox Sparrow

A Ruby-crowned Kinglet utilized a white spruce as a nest-tree. Other birds noted in near-by habitats (some of them quite possibly or probably occurring also in the closed-crown forest) were:

Turdus migratorius nigrideus	Black-backed Robin
Parus hudsonicus hudsonicus	Hudsonian Chickadee
Picoides tridactylus bacatus	American Three-toed Woodpecker
Acanthis linaria linaria	Common Redpoll
Pinicola enucleator eschatosus	Newfoundland Pine Grosbeak
Spizella arborea arborea	Eastern Tree Sparrow
Dendroica striata	Blackpoll Warbler
Canachites canadensis canadensis	Hudsonian Spruce Grouse
Falco columbarius columbarius	Eastern Pigeon Hawk

Closed-crown Forest at Ashuanipi Lake

Forests of this type (fig. 3; also Harper, 1961:pl. 2, fig. 1) occur extensively about the north end of the lake and along its outlet, the Ashuanipi River (National Topographic Series, Ashuanipi sheet). An island about 4 miles from the north end of the lake furnished another fine example of a closed-crown forest. Forests of a more open type, such as lichen woodlands, were scarcely noticed in any local areas that had not been disturbed. The populous settlement, with numerous habitations and industrial buildings, that had sprung up about Mile 224 Airstrip, 2 miles north of the lake, had naturally disturbed the original fauna and flora over a considerable area. The terrain in the immediate vicinity is gently rolling, with differences in altitude of little more than 50 or 60 feet (say from 1740 to 1800 feet). Rock exposures do not appear frequent except along the shores of the lake and the river (fig. 3).

A small proportion of the local plants, with southerly affinities, were not found at Knob Lake or other points visited in higher latitudes; but most of these occur in habitats other than the closed-crown forest, and so do not appear in the following list. My records were secured from August 22 to September 8, and from September 18 to 21.

Trees

Abies balsamea	Balsam fir
Picea mariana	Black spruce
Picea glauca	White spruce
Larix laricina	Tamarack

Shrubs

Ledum groenlandicum	Common Labrador tea
Betula glandulosa	Dwarf birch
Vaccinium angustifolium var. *laevifolium*	Low sweet blueberry
Vaccinium vitis-idaea var. *minus*	Mountain cranberry
Viburnum edule	Mooseberry

Ground Plants (vascular)

Rubus chamaemorus	Baked-apple berry
Cornus canadensis	Bunchberry
Equisetum sylvaticum	Wood horsetail
Dryopteris phegopteris	Long beech-fern
Linnaea borealis var. *americana*	Twin-flower
Gaultheria hispidula	Creeping snowberry

Mosses

Pleurozium schreberi	Feather-moss
Hypnum crista-castrensis	Feather-moss
Sphagnum sp.	Sphagnum moss
Polytrichum sp.	Hair-cap moss
Dicranum fuscescens	

Hepatics

Ptilidium pulcherrimum
Lophozia longidens
Lophozia silvicola

Lichens

Usnea dasypoga	Beard lichen
Usnea longissima var. *tenuis*	Beard lichen
Cladonia coniocraea	Caribou lichen
Cladonia conista	Caribou lichen
Parmelia physodes	
Cetraria pinastri	
Cladonia cenotea f. *crossota*	Caribou lichen
Cladonia deformis	Caribou lichen
Cladonia digitata	Caribou lichen
Nephroma arcticum	

Here the balsam fir becomes very nearly or quite the most abundant tree, whereas at Attikamagen Lake it stands only third or fourth on the list, and at Lac Aulneau it was not noted at all. In its general distribution it is less northerly than the other local conifers. The denseness of these forests is evidently unfavorable for the development of shrubs and vascular ground plants (compare the lists for Attikamagen Lake). Consequently these "moss-rich" forests yielded

a larger number of cryptogams than of vascular plants. Hustich (1954:29; also personal communication) regards these as *old* forests, with the feather-mosses predominant.

Mammals recorded

Clethrionomys gapperi proteus	Labrador red-backed mouse
Tamiasciurus hudsonicus ungavensis	Ungava red squirrel
Lepus americanus americanus	American snowshoe rabbit

Additional species of mammals reported by other persons in the vicinity, and doubtless occurring in the closed-crown forests, included: Labrador flying squirrel (*Glaucomys sabrinus makkovikensis*), eastern Canada porcupine (*Erethizon dorsatum dorsatum*), Labrador red fox (*Vulpes fulva bangsi*), little brown bat (*Myotis lucifugus lucifugus*), eastern woodland caribou (*Rangifer caribou caribou*), and Canada lynx (*Lynx canadensis canadensis*).

A species so fitted to an environment of mosses and lichens as the red-backed mouse is, naturally flourishes in the closed-crown forests of the Ashuanipi area, where the ground is covered with an exceptionally luxuriant growth of these plants. The red squirrel finds a perennial food supply in the cones of the spruces. The porcupine's taste for the bark of balsam and spruce is amply gratified here. The snowshoe rabbit and its predator, the lynx, probably find the dense shade congenial.

But such a dense forest of conifers is not attractive to many birds. The only species rather definitely recorded locally in this habitat were the Hudsonian Spruce Grouse (*Canachites canadensis canadensis*) and the Eastern Myrtle Warbler (*Dendroica coronata coronata*). Others noted or reported in the vicinity, and probably occurring in the closed-crown forest, were: Labrador Jay (*Perisoreus canadensis nigricapillus*), Hudsonian Chickadee (*Parus hudsonicus hudsonicus*), American Three-toed Woodpecker (*Picoides tridactylus bacatus*), and Labrador Horned Owl (*Bubo virginianus heterocnemis*).

Forest at Carol Lake

This small lake (lat. 53°04′ N., long. 66°58′ W.) lies in the extreme western part of Labrador, 4 miles west of Wabush Lake (National Topographic Series, Ashuanipi sheet). Its altitude is estimated at 2000 feet. My stay here extended from September 8 to 18.

The forest about its north end seems to be largely a closed-crown forest, but there is also a fair expanse of open lichen woodland (fig. 4). In addition, there are wooded areas of intermediate char-

acter, and some that can scarcely be classified as either type. The terrain to which I paid particular attention varied in altitude from the lake shore to the upper part of a ridge rising some 300 feet on the east.

Since my field records did not always clearly differentiate the two principal types of this forest, I have endeavored to cover both in the following single account. At the same time, if the record is clear enough, I indicate, in the lists of species, occurrence in the closed-crown forests by the letter symbols (cf) and occurrence in the lichen woodland by (lw). The use of a single set of these symbols after a name does not necessarily imply non-occurrence of that species in the other type of habitat, but simply incompleteness of the records.

The predominant arboreal growth, consisting of white spruces and black spruces, perhaps attains a somewhat larger size here than in some of the more northerly localities. Some of the plants included in the following list as components of the closed-crown forest are probably not of general distribution in it, but may be more or less restricted to boggy, mossy spots of limited extent within it. To this category may belong *Veratum viride, Habenaria dilatata,* and *Senecio pauperculus.*

Trees

Picea glauca (cf[1], lw[2]) ..... White spruce
Picea mariana (cf, lw) ..... Black spruce
Larix laricina (cf, lw) ..... Tamarack
Abies balsamea (cf) ..... Balsam fir
Betula papyrifera (cf) ..... Canoe birch

Shrubs

Betula glandulosa (cf, lw) ..... Dwarf birch
Ledum groenlandicum (cf, lw) ..... Common Labrador tea
Salix vestita (cf) ..... Hairy willow
Vaccinium uliginosum var. *alpinum* (cf) ..... Alpine bilberry
Empetrum nigrum (cf, lw) ..... Crowberry
Vaccinium vitis-idaea var. *minus* (cf) ..... Mountain cranberry
Vaccinium angustifolium var. *laevifolium* (lw) ..... Low sweet blueberry
Salix humilis (lw) ..... Small pussy-willow
Lonicera villosa (lw) ..... Mountain fly-honeysuckle
Salix pellita (lw) ..... A willow
Juniperus communis (cf) ..... Common juniper
Viburnum edule (cf) ..... Mooseberry

Ground Plants (vascular)

Carex vaginata (cf) ..... Sheathed sedge
Carex leptalea (cf) ..... Bristle-stalked sedge
Cornus canadensis (cf, lw) ..... Bunchberry

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[1] Closed forest.
[2] Lichen woodland.

FIG. 1.—Western side of Lac Aulneau, Quebec. In foreground, geological camp in lichen woodland; on horizon, Arctic-alpine area on 1000-foot ridge. August 1, 1953.

FIG. 2.—Perennial snowbank in eastward-facing ravine on Sunny Mountain, Quebec, at approximately 2000 feet. "Alpine garden" in foreground. August 10, 1953.

FIG. 3.—Exterior view of closed-crown forest on west side of Ashuanipi River, 1.5 miles north of Ashuanipi Lake, Labrador. September 4, 1953.

FIG. 4.—Lichen woodland at Carol Lake, Labrador. Vegetation chiefly *Picea mariana* and *Cladonia alpestris;* also including *Larix laricina, Ledum groenlandicum, Empetrum nigrum, Cornus canadensis, Vaccinium angustifolium* var. *laevifolium,* and *Pleurozium schreberi.* September 16, 1953.

FIG. 5.—Burnt tract on northwest side of Knob Lake, Quebec, seven years after the burning. August 6, 1953.

FIG. 6.—Area about the north end of Carol Lake, Labrador, about 3 × 3 miles in extent. An arrow indicates the location of the small string bog investigated near the northwest corner of the lake; a cross, the summit of Lorraine Mountain. A vertical photograph from an altitude of 18,000 feet above sea level, July, 1949. (Courtesy of Royal Canadian Air Force.)

FIG. 7.—String bog near the northwest corner of Carol Lake, Labrador. September 10, 1953.

Epilobium angustifolium (cf, lw)	Fireweed
Deschampsia flexuosa (lw)	Common hairgrass
Calamagrostis canadensis (cf, lw)	Blue-joint grass
Petasites palmatus (cf)	Palmate sweet coltsfoot
Dryopteris disjuncta (cf)	Oak fern
Moneses uniflora (cf)	One-flowered wintergreen
Lycopodium annotinum var. *pungens* (lw)	Bristly club-moss
Veratrum viride (cf)	White hellebore
Clintonia borealis (cf)	Yellow Clintonia
Mitella nuda (cf)	Northern miterwort
Lycopodium complanatum (cf)	Trailing club-moss
Linnaea borealis var. *americana* (cf)	Twin-flower
Habenaria dilatata (cf)	Leafy white orchis
Pyrola secunda var. *obtusata* (cf)	Nodding wintergreen
Senecio pauperculus (cf)	Balsam ragwort
Solidago sp. (cf)	Goldenrod
Coptis groenlandica (cf)	Goldthread

Mosses

Pleurozium schreberi (cf, lw)	Feather-moss
Sphagnum sp. (cf)	Sphagnum moss
Polytrichum spp. (lw)	Hair-cap moss
Hypnum crista-castrensis (cf)	Feather-moss
Drepanocladus uncinatus (cf)	

Lichens

Cladonia alpestris (lw)	Caribou lichen
Alectoria implexa (lw)	
Cladonia gracilis var. *chordalis* (lw)	Caribou lichen
Parmelia centrifuga (lw)	
Cladonia scabriuscula f. *surrecta* (cf)	Caribou lichen
Nephroma arcticum (cf, lw)	
Stereocaulon alpinum (lw)	
Umbilicaria torrefacta (lw)	Rock tripe
Cetraria saepincola (lw)	
Cetraria tuckermani (lw)	
Parmelia enteromorpha (lw)	
Parmelia saxatilis var. *angustifolia* (lw)	
Parmelia stygia (lw)	
Cladonia amaurocraea f. *celotea* (lw)	Caribou lichen
Cladonia gracilis var. *dilatata* f. *floripara* (lw)	Caribou lichen
Cladonia cenotea f. *crossota* (lw)	Caribou lichen
Lasallia papulosa (lw)	

The mammals in this habitat include the following:

Clethrionomys gapperi proteus (cf, lw)	Labrador red-backed mouse
Microtus pennsylvanicus enixus (lw)	Hamilton Inlet meadow mouse
Tamiasciurus hudsonicus ungavensis (cf)	Ungava red squirrel
Lepus americanus americanus (cf)	American snowshoe rabbit
Erethizon dorsatum dorsatum (cf)	Eastern Canada porcupine

The eastern woodland caribou (*Rangifer caribou caribou*), reported in the vicinity of Carol Lake, undoubtedly ranges through a wide variety of habitats, from the forests to the Barrens above the tree-line. The eastern moose (*Alces alces americana*) was also reported. A number of other forest mammals, including such carnivores as the Labrador red fox (*Vulpes fulva bangsi*) and the Ameri-

can black bear (*Euarctos americanus americanus*), must also occur in the area.

Birds

Turdus migratorius nigrideus (cf)	Black-backed Robin
Perisoreus canadensis nigricapillus (lw)	Labrador Jay
Regulus calendula calendula (cf)	Eastern Ruby-crowned Kinglet
Junco hyemalis hyemalis (cf, lw)	Slate-colored Junco
Dendroica coronata coronata (lw)	Eastern Myrtle Warbler
Zonotrichia nigrilora (lw)	Eastern White-crowned Sparrow
Canachites canadensis canadensis (lw)	Hudsonian Spruce Grouse
Loxia leucoptera (cf)	White-winged Crossbill
Spizella arborea arborea (lw)	Eastern Tree Sparrow
Parus hudsonicus hudsonicus (cf)	Hudsonian Chickadee
Hylocichla guttata faxoni (cf)	Eastern Hermit Thrush
Dendroica striata	Blackpoll Warbler

Apparently the Hermit Thrush had not been previously reported at a point so far to the northward in the central interior of the peninsula. In like manner, a closed-crown forest at Attikamagen Lake furnished a high northern record in this general region for the Olive-backed Thrush (*Hylocichla ustulata swainsoni*) (see *antea*, p. 22). It would appear that the shelter of a forest of this type may offer an optimum habitat for certain birds and probably other animals of the Ungava Peninsula as they approach the northern limits of their ranges.

The only amphibians met with were two Cope's Toads (*Bufo terrestris copei*)—one in lichen woodland and one in an adjacent lakeside thicket.

Lichen Woodland at Lac Aulneau

This type of forest (*cf.* Hare, 1950:622, figs. 8, 9; Hustich, 1951*a*: 6–11, figs. 1, 2; Fraser, 1956) occurs on an area of gravelly knolls at the geological campsite (fig. 1; also Harper, 1961:pl. 2, fig. 2) and in its vicinity. Natural conditions had become slightly disturbed by the erection and use of several wooden buildings and half a dozen tents. Yet there had been comparatively little timber-cutting or other destruction of the vegetation.

Trees

Picea mariana	Black spruce
Picea glauca	White spruce
Larix laricina	Tamarack

Shrubs

Vaccinium angustifolium var. *laevifolium*	Low sweet blueberry
Ledum groenlandicum	Common Labrador tea

Empetrum nigrum	Crowberry
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Betula glandulosa	Dwarf birch
Alnus crispa	Green alder
Arctostaphylos alpina	Alpine bearberry
Ledum decumbens	Narrow-leaved Labrador tea

Ground Plants (vascular)

Deschampsia flexuosa	Common hairgrass
Cornus canadensis	Bunchberry

Mosses

Pleurozium schreberi	Feather-moss

Lichens

Cladonia alpestris	Caribou lichen
Cetraria nivalis	
Stereocaulon fastigiatum	
Nephroma arcticum	

The occurrence of *Arctostaphylos alpina* and *Ledum decumbens* in this open type of forest, at an altitude several hundred feet below timber-line, suggests a slight approximation toward alpine conditions.

Mammals

Clethrionomys gapperi ungava	Ungava red-backed mouse
Tamiasciurus hudsonicus ungavensis	Ungava red squirrel

Birds

Perisoreus canadensis nigricapillus	Labrador Jay
Bubo virginianus heterocnemis	Labrador Horned Owl
Lanius excubitor borealis	Northern Shrike

Additional birds occurring in the general camp area, in either lichen woodland or closed-crown forest, and likely to be found in the former habitat though not definitely recorded from it, were:

Turdus migratorius nigrideus	Black-backed Robin
Junco hyemalis hyemalis	Slate-colored Junco
Passerella iliaca iliaca	Eastern Fox Sparrow
Zonotrichia nigrilora	Eastern White-crowned Sparrow
Dendroica coronata coronata	Eastern Myrtle Warbler

Lichen Woodland at Leroy Lake

Between the southwestern cove and the outlet of this lake there is an area of lichen woodland probably less than a quarter of a mile in diameter (National Typographic Series, Boundary Lake sheet, east half). It is gently rolling upland, rising to a maximum of perhaps 20–25 feet above the lake, which is roughly 1590 feet above sea level. The widely spaced trees, with intervening ground cover of lichens

and mosses on a comparatively dry surface, give this area a most inviting parklike aspect (Harper, 1958:pl. 2, fig. 2). It is doubtless a fairly typical example of the lichen woodlands of the Hudsonian Life-zone in the interior of Ungava. It is bordered on one side by a black spruce and tamarack muskeg. My stay lasted from August 18 to 21.

Trees

Picea mariana	Black spruce
Picea glauca	White spruce
Larix laricina	Tamarack

Shrubs

Betula glandulosa	Dwarf birch
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Ledum groenlandicum	Common Labrador tea
Vaccinium angustifolium var. *laevifolium*	Low sweet blueberry
Empetrum nigrum	Crowberry

Ground Plants (vascular)

Cornus canadensis	Bunchberry

Mosses

Pleurozium schreberi	Feather-moss

Lichens

Cladonia alpestris	Caribou lichen
Stereocaulon fastigiatum	
Cladonia gracilis var. *chordalis*	Caribou lichen
Nephroma arcticum	

There is a general similarity between this vegetation and that in the lichen woodland at Lac Aulneau. The two species of spruce, differing but little in abundance, far outnumber the tamaracks. Herbaceous plants other than *Cornus canadensis* were too scarce or inconspicuous to be noticed.

Mammals

Clethrionomys gapperi proteus	Labrador red-backed mouse
Phenacomys ungava crassus	Labrador spruce mouse
Tamiasciurus hudsonicus ungavensis	Ungava red squirrel

The Labrador red-backed mouse is obviously by far the commonest mammal of this habitat. Trails little more than an inch wide, noticed here and there on top of the mosses and lichens, were probably maintained chiefly by it. Melanism in this species was especially pronounced here. Apparently this habitat is too dry and too devoid of grasses to entice any *Microtus* from adjacent muskegs or creek mar-

gins. Fragments of spruce cones, left in piles, testify to the feasts of the Ungava red squirrel.

Birds

Turdus migratorius nigrideus	Black-backed Robin
Perisoreus canadensis nigricapillus	Labrador Jay
Parus hudsonicus hudsonicus	Hudsonian Chickadee
Regulus calendula calendula	Eastern Ruby-crowned Kinglet
Spizella arborea arborea	Eastern Tree Sparrow
Pinicola enucleator eschatosus	Newfoundland Pine Grosbeak

The Robins, in their post-breeding wanderings, seemed to have a distinct penchant for pausing in the tops of spruces. The Labrador Jays were evidently attracted in more than usual numbers by the opportunities for foraging among the food scraps of the camp.

Burnt Tract at Knob Lake

Burnt tracts of various sizes and ages are in evidence in the Ungava landscape. Some of them date from far back, as we may learn from Hind (1863), Low (1896), Cabot (1922), Elton (1942:300–303), Tanner (1947), and others. For example:

"From the Gulf to the barrens, three-fourths of the country has been laid waste [by fire] within the white period, the thin mat of organic soil being burned wholly away over large areas, leaving only rock and sterile subsoil" (Cabot, 1922:191).

"In Labrador . . . probably no part of the wooded area has not at some time or other been devastated by forest fires. Old records . . . contain descriptions of fabulously extensive forest fires. Hind mentions a forest fire raging in the upland of the Gulf of St. Lawrence in 1785, which extended 300 miles in length and probably 200 miles in breadth. . . . At least one half of the forest area of the interior has been totally destroyed by fire within the past twenty-five or thirty years, Low stated in 1896 . . . .

"Forest fires still ravage the interior of Newfoundland-Labrador every summer and appear to have done so from time immemorial. Areas recently devastated by fire thus occupy a considerable part of the total forested area. The fires often burn all through the summer, destroying thousands of square miles of timber land." (Tanner, 1947, 1:401–402.)

My own observations in the interior scarcely support the gloomy picture presented by the authors quoted above. Fires of very recent origin did not appear so numerous nor so extensive as might have been feared. Practically the only ones of this sort that came to my close attention (from the ground) were in the general Knob Lake

area (National Topographic Series, Knob Lake sheet, east and west halves). In various other localities—as at Aulneau, Leroy, Mollie T., Attikamagen, Ashuanipi, and Carol lakes—I have no particular recollection of recent or extensive burnings. On the other hand, as I flew north on July 22 from Knob Lake to Lac Aulneau, no less than three extensive fires were in view from the plane; but a rainy spell that set in two days later put an effective stop to them. The frequency of rain in this region is an important safeguard against long-continuing fires. On the whole, fire losses and hazards may be expected to become more serious in consequence of the industrial development of the interior and the great increase in the human population.

The burned areas of the peninsula, as indicated on Hare's map (1959:map 1), comprise probably no more than 20 per cent of the country south of latitude 56° and certainly less than 1 per cent of the predominantly tundra country north of that latitude.

After considerable flying over the west central portion of the peninsula in 1944, Manning writes (1947:82–83): "The two largest [burnt areas] were toward the head of Moisie River, and at Lake Nichikun." Each covered about 600 square miles. "I estimated that 8 percent of the caribou moss [*Cladonia*] has been destroyed by fire in the last 20 years." (The two areas mentioned may be identified on Hare's map.)

The principal burnt tract that I investigated at various periods, from June to October, extends from Knob and Pierce lakes west past Slimy Lake and northwest past Burnt Creek (fig. 5; also Harper, 1958:pl. 1, fig. 1; pl. 5, fig. 2; and pl. 6, fig. 1). It covers a number of square miles. The part that I visited most frequently was that in close proximity to the seaplane base at the northwest end of Knob Lake. From the lake's edge at 1645 feet it slopes upward over a succession of irregular ridges to a summit at about 2100 feet north of Slimy Lake. A small stream, which I have called Camp Brook, courses through this part.

The fire swept over this area in 1946. It was interesting to note the stage of the regeneration of plant life seven years later (in 1953). Dense, lifeless mats of *Cladonia*, still covering much of the ground, hindered new growth from springing up through them. On the other hand, mosses (particularly *Polytrichum*) had reappeared extensively. Knee- to shoulder-high dwarf birches, putting forth their leaves in June, had restored greenery to much of the landscape. Blueberries of several species were growing luxuriantly. But gaunt, dead, upright trunks of black spruce still dominated the view, although many of

the larger ones had been cut for lumber or firewood. A few spruce seedlings, 5 inches to a foot in height, had started the process of reforestation. Rock ledges and boulders, denuded by the fire of much of their covering of mosses and lichens, lay nakedly exposed on all sides. The former vegetation was obviously an upland spruce forest for the most part; probably both closed-crown forest and lichen woodland had been represented.

The first of the following plant lists is the primary one, pertaining to the extensive and comparatively dry upland areas:

Trees

Picea mariana (dead trunks and new seedlings)	Black spruce
Larix laricina	Tamarack
Picea glauca	White spruce
Betula papyrifera var. *cordifolia*	Canoe birch

Shrubs

Vaccinium angustifolium var. *laevifolium*	Low sweet blueberry
Betula glandulosa	Dwarf birch
Ledum groenlandicum	Common Labrador tea
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Vaccinium vitis-idaea var. *minus*	Mountain cranberry
Alnus crispa	Green alder
Ribes glandulosum	Skunk currant
Viburnum edule	Mooseberry
Vaccinium caespitosum	Dwarf blueberry
Salix humilis	Small pussy-willow
Amelanchier bartramiana	Mountain shadbush

Ground Plants (vascular)

Deschampsia flexuosa	Common hairgrass
Epilobium angustifolium	Fireweed
Cornus canadensis	Bunchberry
Trientalis borealis	Star-flower
Luzula parviflora	Small-flowered wood-rush
Viola adunca var. *minor*	Sand violet
Aster puniceus var. *oligocephalus*	Purple-stemmed aster
Rubus pubescens	Dwarf raspberry
Actaea rubra	Red baneberry
Carex brunnescens	Brownish sedge
Mitella nuda	Northern miterwort
Corydalis sempervirens	Pale Corydalis
Solidago macrophylla var. *thyrsoidea*	Large-leaved goldenrod

Mosses

Polytrichum juniperinum	Hair-cap moss
Dicranum elongatum	
Ceratodon purpureus	

Lichens

Cladonia alpestris	Caribou lichen

Among the plants listed above, *Betula glandulosa* and the various species of *Vaccinium* are probably important items in the food of some of the mammals and birds. Even the capsules of *Polytrichum juniperinum* appear to be taken by White-crowned Sparrows.

The following supplementary plant list adds a number of species that were more or less restricted to the damper areas, such as the banks of Camp Brook, where additional moisture provided them with a more suitable habitat:

Shrubs

Salix vestita	Hairy willow
Salix planifolia	Flat-leaved willow
Rubus idaeus var. *strigosus*	Raspberry
Cornus stolonifera	Red-osier dogwood
Betula minor	Dwarf white birch
Salix cordifolia var. *callicarpaea*	Broad-leaved willow

Ground Plants (vascular)

Viola renifolia var. *brainerdii*	Kidney-leaved violet
Galium triflorum	Sweet-scented bedstraw
Athyrium filix-femina var. *laurentianum*	Lady-fern

Mosses

Pohlia nutans
Aulacomnium palustre

Hepatics

Marchantia polymorpha

A little mouse-trapping was done along the border where the burnt tract closely approached Camp Brook (or even extended directly to it), but practically no traps were set in the burnt tract proper. Thus the records of mammals were obtained by direct observation of themselves, their tracks, or their nests. Old, flattened nests, composed of common hairgrass (*Deschampsia flexuosa*), were frequently noted on the surface of the ground; evidently they had been occupied during the winter beneath a blanket of snow and had been abandoned as this cover melted. They were presumably the homes of *Microtus pennsylvanicus enixus*. Most of the various tracks were noted on fresh snow early or late in the season. Lichens are so slow in regenerating after fires that those of the burnt tracts offer scarcely any food for caribou for a good many ensuing years. Four of the mammal species listed below were definitely attracted to garbage dumps in the burnt tract, and the red fox doubtless was likewise.

Mammals

Clethrionomys gapperi proteus	Labrador red-backed mouse
Microtus pennsylvanicus enixus	Hamilton Inlet meadow mouse
Tamiasciurus hudsonicus ungavensis	Ungava red squirrel
Vulpes fulva bangsi	Labrador red fox
Euarctos americanus americanus	American black bear

Summer residents among the birds appeared more numerous, as to both species and individuals, in this burnt tract than in any of the other local terrestrial habitats. Of course the lack of obstructions to the view (*cf.* fig. 5) made them more readily observable here than in the adjoining stands of thick green timber. Yet there can be little doubt that such species as White-crowned Sparrows and Robins were actually more numerous here than in the other habitats. Probably the same statement is true of the winter-resident Ptarmigan, whose droppings remain in evidence through the summer. The exposed situations of the Robins' nests—on bare, charred stubs of spruces—suggest that these birds have comparatively little to fear from either diurnal or nocturnal predators. The existence of extensive burnt tracts in the Ungava Peninsula very likely results in a larger population of such birds as Black-backed Robins and White-crowned Sparrows on their wintering grounds in the United States as well as in their summer haunts. If more of the dead trees had retained their bark, the insects and the insect larvae that normally live beneath the bark would probably have attracted more of the American Three-toed Woodpeckers. Twenty species of birds were recorded in this habitat.

Birds

Zonotrichia nigrilora	Eastern White-crowned Sparrow
Turdus migratorius nigrideus	Black-backed Robin
Acanthis linaria linaria	Common Redpoll
Perisoreus canadensis nigricapillus	Labrador Jay
Lagopus lagopus ungavus	Ungava Willow Ptarmigan
Hylocichla minima minima	Gray-cheeked Thrush
Iridoprocne bicolor	Tree Swallow
Euphagus carolinus carolinus	Rusty Blackbird
Junco hyemalis hyemalis	Slate-colored Junco
Seiurus noveboracensis	Northern Water-thrush
Larus argentatus smithsonianus	American Herring Gull
Picoides tridactylus bacatus	American Three-toed Woodpecker
Parus hudsonicus hudsonicus	Hudsonian Chickadee
Dendroica striata	Blackpoll Warbler
Dendroica coronata coronata	Eastern Myrtle Warbler
Wilsonia pusilla pusilla	Wilson's Warbler
Lanius excubitor borealis	Northern Shrike
Colaptes auratus	Yellow-shafted Flicker
Sialia sialis sialis	Eastern Bluebird
Zonotrichia albicollis	White-throated Sparrow

The last three species were apparently stragglers beyond the normal northern limits of their ranges. A Flicker was noted on the same dead spruce where Tree Swallows occupied a nest-hole. The Bluebird, if remaining to breed, would have found a similar site suitable. The following were attracted to garbage dumped in the burnt tract: White-crowned Sparrows, Robins, Labrador Jays, Rusty Blackbirds, and Herring Gulls. Redpolls were observed feeding in dwarf birch and alder. The Willow Ptarmigan find here certain foods, such as mountain cranberries, sedge seeds, and buds of willow and dwarf birch, of which they avail themselves in Keewatin (*cf.* Harper, 1953: 36, 40).

A number of Northern Wood Frogs (*Rana sylvatica cantabrigensis*) and one Cope's Toad (*Bufo terrestris copei*) resorted to a pool beside the seaplane base for breeding purposes, and they would have been virtually obliged to traverse some part of the burnt tract in order to reach it.

Muskeg at Lac Aulneau

Muskegs are here considered wooded, boggy, more or less level areas, characterized particularly by a growth of black spruce, Labrador tea, and sphagnum moss (*cf.* Porsild, 1937:138–139; Hustich, 1949*b*:12, 41). I would exclude from the definition of muskeg any treeless expanse of bog.

The chief muskeg investigated at Lac Aulneau is situated on the west side of the lake just south of the geological camp. It covers probably several acres, and it had not been disturbed by human activity. The surface consists mostly of pools of water and mossy hummocks, with some rocks. There is much more than the usual amount of water for a muskeg.

Trees

Larix laricina	Tamarack
Picea mariana	Black spruce

Shrubs

Ledum groenlandicum	Common Labrador tea
Myrica gale	Sweet gale
Salix vestita	Hairy willow
Empetrum nigrum	Crowberry

Ground Plants (vascular)

Carex leptalea	Bristle-stalked sedge
Rubus chamaemorus	Baked-apple berry
Scirpus hudsonianus	Bulrush

Mosses

Sphagnum spp.	Sphagnum moss

Lichens

Cladonia alpestris	Caribou lichen
Cladonia pleurota	Caribou lichen
Cladonia gracilis var. *elongata*	Caribou lichen
Cladonia lepidota	Caribou lichen

Mammals

Microtus pennsylvanicus enixus	Hamilton Inlet meadow mouse
Clethrionomys gapperi ungava	Ungava red-backed mouse

Birds

Junco hyemalis hyemalis	Slate-colored Junco
Turdus migratorius nigrideus	Black-backed Robin
Dendroica coronata coronata	Eastern Myrtle Warbler
Parus hudsonicus hudsonicus	Hudsonian Chickadee
Seiurus noveboracensis	Northern Water-thrush
Regulus calendula calendula	Eastern Ruby-crowned Kinglet
Zonotrichia nigrilora	Eastern White-crowned Sparrow

Amphibians

Rana sylvatica cantabrigensis	Northern Wood Frog

Most of the species listed above thrive in dry or slightly damp habitats, while *Myrica gale, Carex leptalea, Scirpus hudsonianus, Sphagnum, Seiurus noveboracensis,* and *Rana sylvatica* show a more or less distinct preference for particularly moist or aquatic habitats. The presence here of both groups of species may be explained by the variation, among the components of the muskeg's surface, from dry rocks to pools of water.

Open Bogs

String Bogs

One of the most distinctive features of Ungava physiography consists of marshy areas that are known among some of the mining personnel as "festoon marshes." A synonymous term that has appeared commonly in the literature on the subject is "string bogs." Their unusual nature is not readily apparent from the ground, but it becomes conspicuous from the air. From this point of view they might suggest a microtomic section of animal tissue, magnified to gigantic proportions. In typical form they consist of alternating boggy and watery strips, arranged for the most part as irregular but more or less parallel arcs. There is a slight current of water passing

through these bogs, pushing against the terrestrial strips from the concave side. Many of the bogs vary in width from approximately a quarter to half a mile. An unusually extensive aggregation west of Ashuanipi Lake (shown in part in fig. 7) has a NW–SE length of fully 5 miles and a NE–SW width of nearly 3 miles. The bogs appeared to be especially common between the Ashuanipi Lake area and the Knob Lake area; but they were also observed for miles north of Knob Lake and close to Seven Islands as well. They naturally occupy some of the lowest parts of the terrain.

The term "blanket bog" is used in Ireland and elsewhere in northern Europe for bogs of a somewhat similar type. However, the Irish blanket bogs described by Tansley (1953, 2:714–718, pl. 121) seem to bear only slight resemblance to the Ungava string bogs. A particularly noticeable difference in the former is the apparent absence of any regular alternation of somewhat parallel boggy and watery strips, shaped more or less like arcs. The pools of water seem to be of comparatively small extent and of very irregular distribution. Furthermore, Tansley refers (p. 718) to some of the Irish blanket bogs as "lacking free drainage," and he gives little or no indication of solifluction. (See also Boatman, 1957.)

Tanner (1947, 1:396–401, fig. 201) discusses and figures the Labrador "mires," as he calls them:

"These reach their greatest expansion just in the interior within the boundaries of the forest of the finest growth .... They creep very slowly in one more definite direction .... These mires have been partly decomposed by mechanical agents, principally by the frost, and are a mosaic of bog and fen ... where irregularly curved lines of somewhat drier bog vegetation run in festoons across the narrow fen belts with pools of water or turf mud."

Pomerleau (1950:7–8) writes of viewing from the air, in the Otish Mountains area, "the wrinkled peat-bog, whose straight and almost parallel bands of vegetation are separated by basins of water. There are the first visible effects of solifluction. This type of peat-bog, so common in Arctic regions, is formed on slight slopes when the superficial soil slides on a base of permafrost." (Translated from the original French.)

Hare (1952:418, fig. 9) presents an aerial photograph of "Sphagnum-dominated string bogs" near Seven Islands. Polunin (1948) and Dansereau (1955) seem to omit any description or discussion. Hustich (1951*b*) gives little attention to these bogs, but remarks later (1954:7) that he "did not see in the [Knob Lake] area any large

'string bogs' which seem to dominate the granite-gneiss area outside the sedimentary belt (judging from air-trips Seven Islands–Knob Lake and Seven Islands–Goose Bay)."

During the past half-dozen years there has been a succession of papers on the subject, dealing with areas from Ungava to Alaska (see Drury, 1956; Hamelin, 1957; Miss Allington, 1958; Mackay, 1958; Hare, 1959:32; Williams, 1959; and Henoch, 1960).

Miss Allington remarks (1958:90–91) that the string bogs "are not found north of 58° or south of 48° in Québec-Labrador, and are seen at their best in the central part of the peninsula at about 53° N. . . . At Knob Lake . . . no permafrost was found beneath the bogs."

On September 9 and 10 I had an opportunity to investigate a string bog on the northwestern side of Carol Lake (figs. 6 and 7). Here I found the successive pools of water lying at slightly different levels and connected by tiny streamlets running across the terrestrial strips. The latter varied in width from 4 or 5 feet to as many rods. In addition to the alternating boggy and watery strips, there is an outer portion of the bog somewhat similar to the terrestrial strips, but not interrupted by strips of water. In the following list of the vegetation, the distribution of the plants in the three kinds of habitat is indicated by letter symbols, as follows:

(a) outer portion of the bog
(b) terrestrial strips
(c) watery strips

Trees

Larix laricina (small) (a, b) ..... Tamarack

Shrubs

Potentilla fruticosa (a, b) ..... Shrubby cinquefoil
Myrica gale (a, b, c) ..... Sweet gale
Vaccinium uliginosum var. *alpinum* (b) ..... Alpine bilberry
Andromeda glaucophylla (c) ..... Bog rosemary
Kalmia polifolia (a, b) ..... Bog laurel
Ledum groenlandicum (b) ..... Common Labrador tea
Empetrum nigrum (a) ..... Crowberry

Ground Plants (vascular)

Carex exilis (b, c) ..... Coast sedge
Carex ?paupercula (b, c) ..... Bog? sedge
Eriophorum viridi-carinatum (b) ..... Thin-leaved cotton-grass
Danthonia intermedia (a) ..... Wild oat-grass
Carex oligosperma (b) ..... Few-seeded sedge
Sanguisorba canadensis (a, b) ..... Canadian burnet
Primula ?mistassinica (a) ..... Bird's-eye? primrose
Aster radula var. *strictus* (a) ..... Low rough aster

Solidago purshii (a) ..... Pursh's goldenrod
Menyanthes trifoliata (a, c) ..... Buckbean
Triglochin maritima (a) ..... Arrow-grass
Tofieldia pusilla (a) ..... False asphodel

Mosses

Sphagnum sp. (a, b) ..... Sphagnum moss
Scorpidium scorpidioides (b, c)
Pleurozium schreberi (a, b) ..... Feather-moss

It may be noted that this list of plants differs considerably from that recorded by Tanner (1947, 1:398) from "bogs and fens" in the southeastern part of the peninsula.

The only vertebrate detected in this bog was the Hamilton Inlet meadow mouse (*Microtus pennsylvanicus enixus*). The animal and its runways were exceedingly numerous on the terrestrial strips and apparently also on the outer portion of the bog.

Another string bog, about half a mile northeast of Mile 224 Airstrip, was briefly investigated on September 19. Plants of the terrestrial strips included:

Trees

Picea mariana (young) ..... Black spruce
Larix laricina (young) ..... Tamarack

Shrubs

Juniperus communis ..... Common juniper
Chamaedaphne calyculata ..... Leather-leaf

Ground Plants (vascular)

Aster radula var. *strictus* ..... Low rough aster
Sanguisorba canadensis ..... Canadian burnet

In the watery strips were the following plants:

Shrubs

Betula michauxii ..... Michaux's dwarf birch
Chamaedaphne calyculata ..... Leather-leaf

Ground Plants (vascular)

Menyanthes trifoliata ..... Buckbean

Runways and piles of droppings of *Microtus pennsylvanicus enixus* were numerous on the terrestrial strips, and a Cope's Toad (*Bufo terrestris copei*) was found at the margin between a terrestrial strip and a watery strip.

A Moss-sedge Bog at Attikamagen Lake

A mile from the upper end of the Northwest Bay of Attikamagen Lake, on the southeastern side, there is a slightly indented, half-mile-long cove (National Topographic Series, Knob Lake sheet, east half). The light green expanse of an open bog, sloping to the northern shore of the cove, attracts attention from a long distance. It extends perhaps 100 yards back from the shore and is about 60 yards wide. The inner end is about 12–15 feet higher than the outer end at the rocky shore, and a tiny trickle of water courses through it. The pronounced slope of the surface differentiates this bog from practically all the others that I investigated. Despite the slope, the mosses retain a great deal of water and give the bog a decidedly oozy consistency. On three brief visits (July 15, 16, and 17) I found the vegetation composed mainly of mosses and sedges, in which microtine runways and tunnels were numerous. On all sides except the shore the bog is bordered by coniferous forest.

Ground Plants (vascular)

Carex aquatilis	Water sedge
Epilobium palustre	Swamp willow-herb
Menyanthes trifoliata	Buckbean
Smilacina trifolia	Three-leaved Solomon's seal
Carex leptalea	Bristle-stalked sedge

Mosses

Tomenthypnum nitens *Paludella squarrosa* *Mnium affine*

The few above-mentioned species evidently comprise the bulk of the vegetation in the bog proper. *Carex aquatilis* is the predominant vascular plant, and *Tomenthypnum* the predominant moss.

The only mammal found in this bog was the Hamilton Inlet meadow mouse (*Microtus pennsylvanicus enixus*); it was very abundant. No birds were noted actually in the bog.

Toward the eastern edge there is a small isolated sphagnous mound bearing the following additional species: trees—*Picea mariana*; shrubs—*Ledum groenlandicum* and *Empetrum nigrum*; ground plants (vascular)—*Luzula parviflora, Poa alpigena, Equisetum arvense, Mitella nuda,* and *Cornus canadensis*; mosses—*Sphagnum* sp. and *Cratoneuron filicinum.* A single *Microtus pennsylvanicus enixus* was trapped on the mound.

Aquatic Habitats

In this brief consideration of aquatic plants and vertebrates (including a few littoral species), those of lakes, ponds, rivers, creeks,

and brooks will be taken up in turn. Those bodies of water where my observations were made extend from Lac Aulneau in the north (lat. 57°) to Ashuanipi and Carol lakes in the south (lat. 53°).

Lakes

The following notes pertain chiefly to Aulneau, Mollie T., Attikamagen, Knob, Ashuanipi, Stevens, and Carol lakes. Their waters are moderately clear. As far as I have observed, and as far as may be judged from the shallows near shore, these lakes in general have rocky bottoms, which are not particularly favorable for the development of plant life. Many of the shores also are rocky. At Lac Aulneau, however, there is an expanse of sandy bottom adjacent to a sandspit. There are also some sandy beaches on Ashuanipi Lake.

Little precise information seems to have been published concerning the depth of the lakes. According to Low (1896:67, 99, 107, 153, 156, 157, 161), Petitsikapau Lake "is very shallow, and in its widest part it was found not to exceed ten feet in depth." The middle lake of the Menihek Lakes is "very shallow." Nichikun Lake "is not too deep and in many places it is quite shallow." Ashuanipi is "not a deep lake." On the other hand, the depth of Lake Mistassini "in some places exceeds 400 feet"; in Michikamau Lake "the depth is very great," and part of Lake Kaniapiskau "is said to be very deep." Munroe states (1949:171) that in the Knob Lake area "the lakes are for the most part shallow." At a certain spot in Lac Aulneau a depth of about 30 feet (not necessarily the maximum) was reported.

My observations on the plants of the aquatic habitats were too limited to permit a reliable estimate of their comparative abundance. Accordingly the five species are listed in merely systematic sequence.

Plants

Sparganium ?hyperboreum	Northern? bur-reed
Potamogeton praelongus	White-stemmed pondweed
Potamogeton perfoliatus var. *bupleuroides*	Clasping-leaved pondweed
Ranunculus trichophyllus	White water-crowfoot
Myriophyllum alterniflorum	Loose-flowered water-milfoil

At least some of these aquatics enter the diet of certain birds, and doubtless of mammals as well. *Ranunculus trichophyllus* was found in the esophagus and proventriculus of an Ungava Canada Goose taken on one of the lakes near Knob Lake; and a quantity of *Potamogeton perfoliatus* var. *bupleuroides* and *Myriophyllum alternifolium* was floating in the edge of a lake on Gilling River, as if it had been pulled up by the large numbers of these birds that had been fre-

quenting the lake. *Potamogeton* and *Sparganium* are well-known duck foods.

Seven mammals of the Ungava interior regularly and frequently take to the water and have certain structural adaptations for such a life.

Mammals

Ondatra zibethicus aquilonius	Labrador muskrat
Condylura cristata cristata	Star-nosed mole
Castor canadensis labradorensis	Labrador beaver
Mustela vison lowii	Ungava mink
Sorex palustris subspp.	Water-shrew
Lutra canadensis chimo	Ungava otter
Phoca vitulina mellonae	Ungava fresh-water seal

The above list of mammals may serve for the ponds and streams as well. Among other species of more terrestrial habits yet at least occasionally entering the lakes, and reported in such a habitat in 1953, were: Hamilton Inlet meadow mouse (*Microtus pennsylvanicus enixus*), eastern woodland caribou (*Rangifer caribou caribou*), and American black bear (*Euarctos americanus americanus*). Numbers of the meadow mice were found dead in the water or in the stomachs of Lake Trout. Doubtless a considerable proportion of the other local mammal species take to the water now and then.

Eleven kinds of birds were noted on the lakes, or in definite association with such a habitat.

Birds

Branta canadensis interior	Ungava Canada Goose
Larus argentatus smithsonianus	American Herring Gull
Gavia immer	Common Loon
Mergus serrator serrator	Red-breasted Merganser
Bucephala clangula americana	American Goldeneye
Pandion haliaëtus carolinensis	American Osprey
Sterna paradisaea	Arctic Tern
Anas rubripes	Black Duck
Melanitta perspicillata	Surf Scoter
Megaceryle alcyon alcyon	Eastern Belted Kingfisher
Fulica americana americana	American Coot

The Ungava Canada Geese attain first place on this list only by the numbers that pass through on their migrations; those that breed in this part of the Hudsonian Life-zone are scarcely numerous. The Osprey, Arctic Tern, and Kingfisher merely plunge into the water momentarily to obtain their prey in it. The Herring Gull, Common Loon, Red-breasted Merganser, and Arctic Tern seek islands in the lakes for nesting-sites.

Shore birds that frequent the margins of these lakes, and doubtless

step now and then into the shallow water near shore, include the Spotted Sandpiper (*Actitis macularia*) and the Least Sandpiper (*Erolia minutilla*).

The following list of fishes that I found in the interior waters will suffice for the various aquatic habitats, which are indicated thus: l = lake; r = river; c = creek; b = brook.

Fishes

Couesius plumbeus (l, b)	Plumbeous Minnow
Catostomus catostomus catostomus (l, r, c)	Red Sucker
Gasterosteus aculeatus (l)	Three-spined Stickleback
Salvelinus fontinalis (l, r, c, b)	Brook Trout
Coregonus clupeaformis (l, r, c)	Common Whitefish
Cristivomer namaycush (l, r)	Lake Trout
Cottus cognatus (l)	Great Bear Lake Sculpin
Prosopium cylindraceum quadrilaterale (l, r, c)	Round Whitefish
Salmo salar ouananiche (l, r)	Ouananiche
Lota lota lacustris (l)	American Burbot
Esox lucius (l, r)	Northern Pike

This boreal fish fauna is perhaps noteworthy for the large proportion of predaceous species (*Cristivomer, Salvelinus, Salmo, Esox,* and *Lota*), and also for the poor representation of the Cyprinidae—by a single species, *Couesius plumbeus.* No fishes were detected in the small ponds or in the string bogs.

Small Ponds at Lac Aulneau

Two of these ponds lie within the wooded area just south and west of the geological camp; yet their immediate shores, at least in part, are open and treeless. The ponds are perhaps 100 feet or a little more in diameter. Among the vascular plants, a sedge, *Carex rostrata,* and the narrow-leaved bur-reed, *Sparganium angustifolium,* grew in the shallow water. The former was predominant.

The following were found on the damp, mucky, or muddy shores, and for the most part in the open:

Carex lenticularis	Lenticular sedge
Carex saxatilis var. *miliaris*	Rock sedge
Juncus filiformis	Thread rush
Petasites sagittatus	Arrow-leaved sweet coltsfoot
Petasites vitifolius	Grape-leaved sweet coltsfoot

The habitat of *Petasites sagittatus* was somewhat different: a spot where the mucky border extended into adjacent spruce woods. All the plants mentioned above, with two exceptions, were noted as abundant. The two exceptions were *Sparganium angustifolium* and *Petasites vitifolius,* which I regarded as not common. I found the two *Petasites* nowhere else in Ungava, and *Carex lenticularis* at only one other place—an island in Attikamagen Lake.

An American Goldeneye (*Bucephala clangula americana*), frequently seen at one of the ponds, indicated by its actions that it probably nested in the vicinity. Some small mollusks (*Lymnaea palustris*) at the border of the pond may have furnished an incentive for the bird's visits.

The Wood Frog (*Rana sylvatica*) was reported calling at one of the ponds in June.

Boggy Ponds at Mile 224 Airstrip

Two small ponds, with bordering sphagnous bogs, are located on the east side of Mile 224 Airstrip, at a distance of some 2 miles north of Ashuanipi Lake. Each of the ponds, including its sphagnous borders, is only about a quarter of a mile in diameter and is thus too small to be represented on the Ashuanipi sheet (National Topographic Series). They lie opposite the north and the south ends of the airstrip, respectively, and at a distance of perhaps 250 yards from it. Their altitudes are approximately 1775 feet (northern pond) and 1740 feet (southern pond). They are more or less surrounded by spruce woods (*cf.* Harper, 1961, pl. 1, fig. 2). My visits were made on various dates from August 23 to September 6 and from September 18 to 21.

Of the plants listed below, *Potentilla palustris, Utricularia vulgaris,* and *Nuphar variegatum* were growing in the water of the southern pond; *Myrica gale,* both in the edge of the pond and on the sphagnum; *Carex lasiocarpa* var. *americana,* on a "floating battery"; and the others, on the sphagnous borders.

Trees

Picea mariana	Black spruce
Larix laricina	Tamarack

Shrubs

Chamaedaphne calyculata	Leather-leaf
Ledum groenlandicum	Common Labrador tea
Myrica gale	Sweet gale
Kalmia polifolia	Bog laurel
Andromeda glaucophylla	Bog rosemary
Gaultheria hispidula	Creeping snowberry
Vaccinium uliginosum var. *alpinum*	Alpine bilberry
Empetrum nigrum	Crowberry
Betula michauxii	Michaux's dwarf birch

Ground Plants (vascular)

Carex oligosperma	Few-seeded sedge
Rubus chamaemorus	Baked-apple berry
Carex rostrata	Beaked sedge
Eriophorum gracile	Slender cotton-grass

Smilacina trifolia	Three-leaved Solomon's seal
Carex lasiocarpa var. *americana*	Slender sedge
Equisetum sylvaticum	Wood horsetail
Menyanthes trifoliata	Buckbean
Potentilla palustris	Marsh cinquefoil
Sarracenia purpurea	Pitcher-plant
Oxycoccus microcarpus	Small cranberry
Utricularia vulgaris	Greater bladderwort
Sanguisorba canadensis	Canadian burnet
Nuphar variegatum	Northern yellow pond-lily

Mosses

Sphagnum sp.	Sphagnum moss
Pleurozium schreberi	Feather-moss
Drepanocladus aduncus	

Trapping on the sphagnous borders yielded several specimens of the mouse first mentioned below, and only one specimen each of the other two:

Clethrionomys gapperi proteus	Labrador red-backed mouse
Microtus pennsylvanicus enixus	Hamilton Inlet meadow mouse
Phenacomys ungava crassus	Labrador spruce mouse

Of the following birds noted at the ponds, most or all of the ducks and the geese were on the water, while the Greater Yellowlegs and the White-crowned Sparrow were on the sphagnous borders:

Anas rubripes	Black Duck
Anas acuta	Pintail
Bucephala clangula americana	American Goldeneye
Larus argentatus smithsonianus	American Herring Gull
Anas carolinensis	Green-winged Teal
Branta canadensis interior	Ungava Canada Goose
Totanus melanoleucus	Greater Yellowlegs
Zonotrichia nigrilora	Eastern White-crowned Sparrow

Two species of mollusks (*Gyraulus circumstriatus* and *Sphaerium securis*) and some amphipod crustaceans (*Hyalella azteca*), found among *Utricularia vulgaris* in the more southerly pond, may have been acceptable as food for the American Goldeneyes that were seen there on several occasions.

Rivers, Creeks, and Brooks

The streams under present discussion include the Ashuanipi River, the unnamed outlets of Wapanikskan, Leroy, Mollie T., and Hanna's lakes, unnamed inlets of Aulneau, Attikamagen, and Carol lakes, Slimy and Sucker creeks, Camp Brook, and a brook tributary to a boggy pond at Mile 224 Airstrip. They are situated between latitudes 53° and 57°05′ N. In general, they have a moderate to rapid current, fairly clear water, and a more or less rocky bottom. But here

and there, at least in the smaller streams, there may be a sluggish current and a mucky bottom.

In the following list of stream plants, the habitats in which each was found are indicated by letter symbols: r = river; c = creek; b = brook. The species are listed in systematic sequence.

Isoëtes muricata (r)	Quillwort
Potamogeton alpinus var. *tenuifolius* (c)	Northern pondweed
Potamogeton gramineus (r)	Various-leaved pondweed
Nuphar variegatum (c)	Northern yellow pond-lily
Callitriche anceps (b)	Two-edged water-starwort
Hippuris vulgaris (r, c)	Common mare's tail

The brevity of this list suggests a paucity of vascular plant species in the streams (*cf.* Hustich, 1951*b*:200–201). Besides the plants listed above, *Equisetum limosum* was found on the wet shore of Ashuanipi River, where it was probably inundated at times of high water.

Mammals and fishes of these waters have been very sketchily discussed in the preceding account of the lakes. Bird life on the streams seems to be even scarcer than on the lakes. In August several Black Ducks (*Anas rubripes*), an American Osprey (*Pandion haliaëtus carolinensis*), two American Herring Gulls (*Larus argentatus smithsonianus*), and an Eastern Belted Kingfisher (*Megaceryle alcyon alcyon*) were noted on or over Ashuanipi River, and a Greater Yellowlegs (*Totanus melanoleucus*) and several Spotted Sandpipers (*Actitis macularia*) were seen along its shores. A Kingfisher was also recorded along Sucker Creek in June.

Summary and Conclusions

In the interior of the Ungava Peninsula, within the general confines of the Hudsonian Life-zone, there are many Arctic-alpine areas, with a flora and a fauna approximating those of the Barren Grounds proper, which occupy the northern part of the peninsula and certain narrow coastal strips, east and west. The altitude of the tree-line decreases from about 2550 feet in latitude 53° to 900 feet in latitude 57°. This decrease is accelerated toward the north, in correlation with the lowering of the temperature as a nearer approach is made to the cold waters of Ungava Bay.

The forests of the Hudsonian Life-zone are predominantly coniferous, with white spruce (*Picea glauca*) and black spruce (*P. mariana*) far outnumbering the other trees. Closed-crown forest, lichen woodland, and muskeg are the principal forest types. Open bogs, with a predominant growth of mosses and sedges, are common. The so-called "string bogs," with alternating boggy and watery strips,

whose peculiar formation makes a much more striking picture from the air than from the ground, are a special type worthy of much more study than they have received so far.

Aside from scattered and stunted conifers of several species, some of the commoner or more characteristic plants of four Arctic-alpine areas (at Lac Aulneau, Sunny Mountain, Ruth Lake Ridge, and Lorraine Mountain) are indicated below, in the approximate sequence of their abundance:

Shrubs—*Betula glandulosa, Vaccinium uliginosum* var. *alpinum, Empetrum nigrum, Vaccinium vitis-idaea* var. *minus, Arctostaphylos alpina, Salix* spp., *Ledum groenlandicum,* and *Phyllodoce caerulea.*

Ground plants (vascular)—*Carex bigelowii, Poa glauca, Epilobium angustifolium, Diapensia lapponica, Arenaria groenlandica, Lycopodium annotinum* var. *pungens, Tofieldia pusilla, Luzula parviflora, Coptis groenlandica,* and *Lycopodium selago.*

Mosses—*Rhacomitrium lanuginosum.*

Lichens—*Cladonia alpestris, Parmelia centrifuga, Alectoria ochroleuca, Stereocaulon fastigiatum, Cladonia rangiferina,* and *Rhizocarpon geographicum.*

Some of the principal components of the vegetation of the closed-crown forests (at Aulneau, Attikamagen, Ashuanipi, and Carol lakes) may be likewise listed:

Trees—*Picea glauca, P. mariana, Larix laricina,* and *Abies balsamea.*

Shrubs—*Ledum groenlandicum, Betula glandulosa, Alnus crispa, Salix vestita, Vaccinium vitis-idaea* var. *minus, Empetrum nigrum,* and *Viburnum edule.*

Ground plants (vascular)—*Cornus canadensis, Carex vaginata, Equisetum sylvaticum, Mitella nuda, Moneses uniflora, Linnaea borealis* var. *americana, Rubus chamaemorus, Coptis groenlandica, Pyrola secunda* var. *obtusata, Petasites palmatus, Dryopteris phegopteris, Gaultheria hispidula,* and *Dryopteris disjuncta.*

Mosses—*Pleurozium schreberi, Hypnum crista-castrensis, Sphagnum* spp., *Dicranum fuscescens,* and *Hylocomium splendens.*

Lichens—*Alectoria implexa, Parmelia encausta, Cetraria pinastri, Nephroma arcticum, Cladonia gracilis* var. *chordalis, C. alpestris, C. cenotea* f. *crossota, Usnea dasypoga,* and *U. longissima* var. *tenuis.*

Two areas of lichen woodland (at Aulneau and Leroy lakes) present the following picture of the major vegetation:

Trees—*Picea mariana, P. glauca,* and *Larix laricina.*

Shrubs—*Vaccinium angustifolium* var. *laevifolium, Ledum groenlandicum, Vaccinium uliginosum* var. *alpinum, Betula glandulosa,* and *Empetrum nigrum.*

Ground plants (vascular)—*Cornus canadensis* and *Deschampsia flexuosa.*

Mosses—*Pleurozium schreberi.*

Lichens—*Cladonia alpestris, Stereocaulon fastigiatum, Nephroma arcticum, Cetraria nivalis, Cladonia gracilis* var. *chordalis.*

Some of the plant species that appear in the preceding lists were not recorded in *each* locality among a given group of similar habitats; but more thorough search probably would have revealed them as generally distributed in that group.

Since the remaining habitats discussed are represented, for the most part, by only one or two examples, there is evidently little need of drawing up summaries of their major vegetation.

The vertebrate fauna is rather limited in species. The marked severity of the winter climate requires the withdrawal of insectivorous and fresh-water birds, while the deep snow hampers the movements of terrestrial (*versus* arboreal) mammals, large as well as small. The average daily mean temperature in January is –13° F. at Fort McKenzie and Knob Lake, and –9° at Sandgirt Lake. The average annual snowfall is about 76 inches at Fort McKenzie, 132 inches at Knob Lake, and 143 inches at Sandgirt Lake. Despite these adverse conditions, there are periodic peaks of great abundance among at least three of the smaller mammals: Labrador varying lemming (*Dicrostonyx hudsonius*), Labrador red-backed mouse (*Clethrionomys gapperi proteus*), and Hamilton Inlet meadow mouse (*Microtus pennsylvanicus enixus*).

Bird life in the boreal coniferous forests is well known to be scanty. Food is apparently less abundant than in the deciduous forests of lower latitudes. Most of the species travel far to the southward for the winter. Hazards of long migration routes, at least occasional inclement weather at the breeding season, and a summer too brief to permit more than a single brood as a rule, tend to keep the avian population down. Perhaps difficulty in finding sufficient food for the young has resulted in generally smaller egg clutches here than among the same species in milder climates.

Burnt tracts, after a few years of plant regeneration, seem to constitute a distinctly favorable breeding haunt for certain birds, such as Eastern White-crowned Sparrows (*Zonotrichia nigrilora*) and Black-backed Robins (*Turdus migratorius nigrideus*). But the dearth of sufficient cover and of year-round food seems to deter most of the mammals from taking up their abode in these tracts in anything more than limited numbers.

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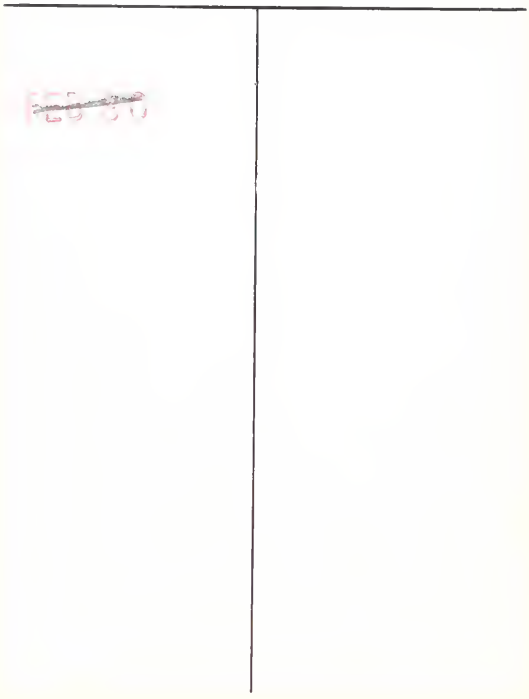

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